VOL. 28 NO. 5

BULLETIN

OF THE

TORREY BOTANICAL CLUB

MAY 1901

Ceramothamnion codii, a new Rhodophyceous Alga

BY HERBERT M. RICHARDS

(WITH PLATES 21, 22)

While in Bermuda during February, 1898, the writer collected a quantity of *Codium tomentosum* which proved on examination to have growing upon it an epiphytic rhodophyceous alga that is decidedly peculiar in character. More material was obtained during the February of the following year and from these collections the following account of the morphology of this alga was written. *Codium tomentosum* is common enough in the waters about the islands, but only that obtained at two localities on the south shore proved to have growing upon it this *Callithamnion*-like alga. *Codium* is a favorite abiding place of many small algae and it is very common to find the fronds fringed with small species of *Callithamnion*, *Ceramium*, *Ectocarpus*, *Goniotrichum*, etc. The form, however, which is the subject of this paper is not so conspicuous, scarcely more than slightly reddening the parts on which it grows, the filaments being so short and so fine as to be scarcely visible to the naked eye. Only occasionally are small tufts found in the dichotomies of its host and even these would be hardly noticed were it not for their red color.

In habit it suggests a form like *Rhodochorton Rothii*, there being a prostrate filament which sends up at irregular intervals erect filaments, that are always unbranched except under certain

[Issued May 21]

conditions of fruiting. Since this plant lives upon the soft tissues of another alga there are also developed well-marked rhizoids which penetrate between the external cells of the *Codium* (Fig. 1).

The prostrate and upright filaments are alike in structure, differing only in the somewhat larger size of the former, which measure from 30–50 μ in diameter at the internodes, while the latter vary from about 20–35 μ. The structure of the filaments is peculiar, and at once attracts attention, from its similarity yet unlikeness to that of two other genera of algae. They are monosiphonous as to the elongated internodal cells (which average 50 μ long), while at the nodes there are rows of small cells. Such a condition suggests at once *Ceramium* but the general appearance of the cells is far more like those of *Callithamnion* (Fig. 2). The wall is somewhat thick and the sides parallel, never bulging as in *Ceramium*, while the chromatophore is very distinct and made up of thickened strands as is usual in *Callithamnion*. In consequence of this the internodes are distinctly red in color, never, as is often the case in *Ceramium*, quite diaphanous, and it may be added the tips of the young branches are straight, never circinate. The nodal cells, which in the oldest part of the frond are in from three to four rows, lie closely packed between the adjoining internodes. They do not ever, even in the oldest portions of the plant, proliferate downwards and upwards to form a cortication, but only overlap the somewhat tapering ends of the internodal cells, lying in the constrictions formed between the latter, so that they do not produce any marked nodal swellings. Their chromatophores are of the same appearance as those of the internodes, but the granulation of the contents is more marked and consequently it is of a deeper color. One might describe the general appearance of the filament as that of *Callithamnion* and its allies with the addition of nodal cells.

At the tips of the filaments are found small apical cells, from which the formation of nodes and internodes takes place in an entirely regular manner (Figs. 2, 3). There is first cut off from the apical cell by a transverse basal wall a single indifferent cell. This indifferent cell soon divides from its upper end, by four obliquely anti-clinal walls of small cells which when seen in optical section are naturally triangular; the hypothenuse being the newly-

formed wall. These are the young nodal cells and their formation does not appear to be always simultaneous, nor when successive, in any particular order. The next step in the formation of the node is the rounding off of these cells and their transverse division. There are now two rows of cells, which subsequently may become by division two double rows of eight cells each, or sixteen cells in all at the nodes. Sometimes but one of the original two rows divides again transversely, in which case there will be but twelve cells in the node, disposed in one single and one double row. But in the older parts of the filaments the rows ultimately become displaced, owing to irregular divisions of some of the cells.

The internodal cells develop by enlargement in all directions, particularly in length, and the original tapering end caused by the obliquely formed walls of the nodal cells increases rather than diminishes. It is this constriction between the internodes which is, as has before been said, closely packed with the nodal cells, the outline of the filament being almost straight and continuous. The erect branches arise from the nodes of the procumbent filaments, one of the nodal cells on the upper surface taking on the function of the apical cell of the branch. Each node may produce its branch, but no cases were observed where more than one arose from a single node (Fig. 1). The rhizoids which grow into the tissue of the *Codium* also originate from nodal cells of the main filament, but from the under side of course, and make their way downwards into the tissue of the host. They are colorless, or almost so, and often sparingly dichotomous, exhibiting no especial peculiarities. Branching of the upright filaments is seen only in connection with the formation of certain forms of the fruit which will be considered later.

Some of the material collected was found to be provided with hairs which arise from the nodal cells. While usually short (Fig. 4) they are sometimes prolonged as in Fig. 5. The short hairs cannot be considered simply younger ones for they are often found on fully matured portions of the filament. Their contents indicate that they are simply sterile hairs, as it is very scanty and gathers at the end in the way common among such organs. They were also found on material in all conditions of fructification.

The fact that they must be regarded as merely sterile is of importance in another consideration to be taken up later. While the bulk of the material examined was quite destitute of them it is barely possible, although not at all probable, that this condition was brought about by the shedding of the hairs, since indications were seen of their abstriction in certain cases.

While the structure of the frond of this alga is not without interest the fruit, at least the tetraspore, is more especially noteworthy. Indeed as regards certain features in the growth of the tetraspores the writer has found no mention of a similar condition among other Florideae. As would be supposed the tetraspores are formed at the nodes in the younger portions of the upright branches ; one can easily observe almost all stages on a single filament (Fig. 8). The tetrasporangium itself always arises from a cell in the upper of the two rows of cells at a young node, only a single one developing at one node. After a slight enlargement, chiefly elongation, of this mother cell of the tetraspores the adjoining nodal cells are seen to become actively concerned in the growth (Fig. 8). They begin to grow outwards and around the young tetrasporangium forming bract-like enveloping branches, something like a stichidium with but a single group of tetraspores. The extent to which the enveloping branches develop varies, sometimes only one is produced (Fig. 13), representing the prolongation of a single row of nodal cells, sometimes the single row itself branches and forms an almost complete covering to the tetrasporangium, while again several separate rows of nodal cells may develop in this fashion. The tetraspores are not tetrahedral, but are arranged rather in the cruciate fashion, where however the longitudinal divisions following the first transverse division of the mother cell, are in planes at right angles to each other. When the filaments lie in the position which they naturally assume when attached to the basal prostrate filament, it appears that it is always the distal or upper cell in the young tetrasporangium which has divided in a plane at right angles to the field of vision (Figs. 10, 12, 13). After the spores are ripe the outer wall of the sporangium, which is often considerably thickened, breaks open at the apex and they escape, leaving the empty shell attached to the plant. Then follows a peculiar proliferation, if one may term it so, of the cell which lies

at the base of the tetrasporangium. From this a new tetrasporangium starts up, growing into the cavity of the old one and provided with its own thickened wall. This is in turn replaced by another, and yet another, so that one often finds a young tetrasporangium surrounded by the remains of the walls of perhaps four or five earlier ones (Figs. 10, 11), something in the manner of the proliferation often noticed in the zoösporangia of *Saprolegnia*. In no instance was more than a single ripe tetrasporangium observed at each node; in the case shown in Fig. 12, the new one has begun its development somewhat earlier than is usual, but no doubt had the older tetraspores been discharged it would have been forced into the empty cavity. This condition of the successive formation of new tetrasporangia within the older ones does not seem to have been noted in any other form, a fact which makes the appearance presented by this alga in its tetrasporic stage very characteristic.

The antheridia, which like the antheridia of the bulk of the Florideae, consist of an aggregation of small cells each containing a single spermatium, originate from the outgrowth of the nodal cells. The latter, dividing into many small cells, spread upwards and downwards from the nodes, usually completely covering the intervening internodal cells (Fig. 22); sometimes considerable portions of a filament are so modified to form one long antheridium, or, to speak more strictly, a collection of the unicellular antheridia. The spermatium-bearing cells may remain closely appressed to the sides of the internodal cell as is shown in the section in Fig. 22, or, by reason of a growth more rapid than the lengthening of the internodes, may bulge outwards in more or less rounded masses (Fig. 21). The antheridia were never seen on the same plants as the tetraspores, but usually occur alone, although in a few cases they were observed on the same plant or even the same filament as certain polyspores.

These polyspores which first attracted attention in their mature condition naturally aroused the suspicion that they might be favellae of the *Callithamnion* type, especially since the well-defined antheridia described above were also seen. But as the following description shows the most careful search failed to substantiate any such idea, although the development of these spores were worked out in detail. Unfortunately nothing which could be called a

trichogyne or trichophoric apparatus was revealed. The polyspores occur as considerable aggregations, enclosed in a definite wall, and borne in the axils of certain specially developed branches (Fig. 20). It is only in this connection that the upright filaments ever branch; an irregular whorl of branches is formed with the main axis of the filament continuing above them, and at their bases are formed one or more large favella-like masses of irregularly arranged spores. The branches, which vary from two to as many as five in number, usually assume ultimately an equal length with the original axis, sometimes even surpassing it in importance and in so doing often push it to one side, making it quite indistinguishable. In consequence of this the masses of mature polyspore often appear to be borne terminally on an irregularly forked filament. By following their development it can be seen, however, that these branches arise as lateral outgrowths from the cells of the younger nodes (Figs. 15, 16, 17), originating in all respects after the manner in which the upright filaments spring from the prostrate one, except that two or more arise from each node. After the beginning of these outgrowths it appears that the axis from which they spring ceases to develop to any extent, all of its vitality being spent in the production of the polyspores and the accompanying whorl of branches. In a few instances a second node below also produces a few side branches, but these never develop to any great length, nor were polyspores seen to be borne in their axils. In the formation of a branch one of the nodal cells takes on the function of an apical cell while the surrounding ones multiply somewhat and as the new internodal cell formed from the apical cell enlarges from around its base a junction with the parent axils, four or five nodes, and occasionally many more are formed before any activity in the direction of the origin of the polyspores is to be observed. For this reason it is often difficult to trace the exact point of origin of the latter. The polyspores, however, were found to originate always from the node of the main axis immediately above the one which gave rise to the whorl of branches (Figs. 16, 17, 18). The cells begin to multiply more rapidly, and form groups of four or five cells; these ultimately by still further division and by great increase in size produce the favella-like masses figured in Fig. 20. First one group develops, then an-

other closely following, and perhaps even a third and fourth mass of spores is formed, reminding one of the polyspores found in certain species of *Ptilota*. In the older stages it is impossible to tell where the spores are attached, they are often so displaced as to appear to have to do with the next node below the one from which they really arose, although in following their development no case —with the possible exception of the one shown in Fig. 17—was observed where any other than the first node above the whorl of secondary branches produced any outgrowth. Signs of a slight activity in the nodes above were occasionally noted, but this never led to the formation of polyspores.

The masses of polyspores, apparently mature, vary in size from about 50–80 μ by 35–60 μ, they are never spherical, and vary also in the number of spores contained, which was from twelve to twenty, in specimens counted. The spores themselves are also irregular in shape and size being, irregularly polyhedral from compression, and measuring from 15 to 20 μ in their greatest diameter.

In connection with the development of these apparently wholly non-sexual spores, it is necessary to refer again to the hair-like processes found springing from the cells in some instances. As has been previously noted, some of the material collected showed the hairs while other material was devoid of them. When first observed on a polysporic specimen it was hoped that they were, indeed, trichogynes, but subsequent investigation showed that these hairs also occurred on antheridial and even tetrasporic specimens (Figs. 9 and 23), and that their lack of contents except at the very tip placed them undoubtedly in the category of the hair-like processes common with other algae. Nor was anything in the nature of trichophoric apparatus found in connection with them. Even where they were present on the same node with the young polyspores (Fig. 16) there was no connection apparent. In short, they lacked the easily recognized appearance of trichogynes and trichophoric cells, which is familiar to any one who has studied Florideae.

To sum up, it may be said that this alga, epiphytic on *Codium tomentosum*, is in habit similar to *Rhodochorton*, and in the general appearance of the cell and its chromatophore like other forms of the genus *Callithamnion;* that it has, as to the filament as a

whole, the structure of a *Ceramium* with its clustered nodal and bare internodal cells, and that it is furnished with polyspores reminiscent of those of *Ptilota*. The general appearance, however, is very dissimilar to any of these, and it is further marked by the peculiarity of the proliferating tetrasporangia. Since it is, therefore, impossible to place this form satisfactorily in any of the established genera, and since its peculiarities are sufficiently marked, it seems justifiable to assign it to a new genus, the diagnosis of which is appended.

Ceramothamnion gen. nov.

Plant consisting of prostrate filaments giving rise above to erect filaments, and below to rhizoids. Erect and prostrate filaments same in structure, monosiphonous throughout with small cells collected at nodes: growing tip straight, never circinate: chromatophores rhodophyceous, in elongated bands running almost the length of the internodal cells: tetraspores, antheridia and polyspores present: tetrasporangia borne at nodes: cruciate; provided with enveloping sterile cells, proliferating by successive formation of new tetrasporangia inside of the old.

Ceramothamnion codii sp. nov.

Prostrate filaments 30–50 μ in diam., never branched except for erect filaments which arise at nodes: erect filaments 20–35 μ in diam., from 0.5 to 1.5 mm. long, sterile, always unbranched, branches arising in connection with polyspores; outer wall usually unbroken and continuous, but at times pierced by sterile hairs which arise from the nodal cells; nodal cells in maturity usually 12–16 at each node, never forming a complete cortication to the internodal cells; mature tetrasporangia single at node, 30–45 × 20–30 μ, partially covered with enveloping sterile cells: proliferating as described above: polysporangia variable in size, 35–60 × 50–80 μ arise laterally from the erect filaments, and consist at maturity of clusters of from 10 to 20 polyspores: several of the clusters—from two to four—are grouped together and are surrounded by protecting branches. Procarpes and cystocarps not observed. Antheridia in masses sheathing the internodal cells, or forming more or less rounded masses from node to node. Polyspores and antheridia usually on separate plants, occasionally on same filament.

Habitat.—Forms minute tufts or small expanses on *Codium tomentosum* among the cortical ramifications of which its rhizoids

penetrate. Collected in February on the south shore of the main island of Bermuda.

Explanation of Plates 21, 22

PLATE 21

FIG. 1. Habit, showing the prostrate and erect filaments, rhizoids and masses of polyspores.

FIG. 2. Growing tip, showing also the appearance of the chromatophores in the internodal cells.

FIG. 3. Same in different stage of division.

FIG. 4. Tip provided with short hairs.

FIG. 5. Tip where the hairs are greatly elongated.

FIGS. 6 and 7. Formation of new apical cells in a broken filament.

FIG. 8. Tetrasporangia in various stages of development.

FIG. 9. Tetrasporangia on same filament with hairs.

FIGS. 10 and 11. Tetrasporangia developing within the empty walls of previous ones.

FIG. 12. Tetraspores almost ripe with young tetrasporangium developing.

FIG. 13. Fully developed tetrasporangium showing bract-like covering.

FIG. 14. Empty sporangium after discharge of spores.

PLATE 22

FIG. 15. Showing the origin of whorl of secondary branches.

FIGS. 16, 17, 18. Various stages in development of polyspores.

FIG. 19. Abnormal development of polyspores at an early stage.

FIG. 20. Mature polyspores.

FIG. 21. Mature antheridium.

FIG. 22. Optical section of antheridium.

FIG. 23. Young antheridia developing. The nodal cells above have produced hairs.

All the figures were drawn with an Abbe camera. 1, $\times$ 30 diam.; 2–14, $\times$ 420 diam.; 15–23, $\times$ 480 diam., and reduced about one third. The drawings were made from specimens preserved in alcohol and treated with lactic acid causing the outer wall to swell away from the contents to some extent.

Studies on the Rocky Mountain Flora.—V.

By P. A. Rydberg

Sporobolus aristatus sp. nov.

Vilfa depauperata var. *filiformis* Wats. King's Exp. 5 : 376, in part (as to the awned form). 1871. Not Thurb.

Perennial with short branching rootstock. Culm usually only 4–6 cm. high : internodes short, usually covered by the open strongly striate sheath ; ligules lanceolate, acute, about 1.5 mm. long : leaf-blades 8–14 mm. long, and about 1 mm. wide, striate and puberulent on the upper surface : panicle few-flowered, very narrow, with short erect branches ; empty glumes almost equal, or the inner slightly longer, 1–1.25 mm. long, less than half as long as the flowering glume, ovate, acutish or obtuse and somewhat erose at the apex : flowering glume about 2.5 mm. long, strongly veined, long-strigose on the veins and tipped with an awn .5–1 mm. long ; palet almost equal to the flowering glume (awn excepted) in length, acuminate, but not awned, strigose.

This species is closely related to *S. filiformis* (Thurb.) Rydb. differing in the lower habit, less exserted panicle, firmer empty glumes and the presence of a distinct awn. It grows in wet places at an altitude of 2000–2500 m.

Wyoming : Big Horn Mountains, Sheridan Co., 1899, *F. Tweedy, 2196* (type) ; Spread Creek, 1897, *27*.

Utah : Bear River Cañon, 1869, *S. Watson, 1281*.

Poa platyphylla Nash & Rydb.

Poa trivialis var. *occidentalis* Vasey, Desc. Cat. Grasses 85. 1885. Not *Poa flexuosa* var. *occidentalis* Vasey. 1878.

Poa occidentalis Vasey, Cont. U. S. Nat. Herb. **1** : 275. 1893.

Carex ebenea sp. nov.

Perennial by a cespitose rootstock. Stem 2–4 dm. high, strongly striate ; sheath with a conspicuous membranaceous ligular portion, ligule proper rounded, about 2 mm. long ; leaf-blades flat, 1–2 dm. long, 3–6 mm. broad, strongly nerved : spikelets about 1 cm. long in a dense globular or rounded-conical head :

shining, brownish black with a lighter midrib, lanceolate, acute, 3–4 mm. long: perigynia lanceolate, tapering gradually into a long beak, with the beak about 5 mm. long, dark brown; staminate flowers at the base and mixed with the pistillate: upper portion of the wings and the beak scabrous on the margins; teeth at the apex of the beak very short, subulate: styles 2: achene oblong, lenticular, nearly 2 mm. long and fully 1 mm. broad.

This species is nearest related to *C. festiva* and has been labeled *C. festiva Haydeniana*, but it is not the same as the original of that variety, which has broadly ovate perigynia. *C. ebenea* differs also from all forms of *C. festiva* in the form of the perigynia and in the dark glossy color of the bracts and perigynia.

COLORADO: Pikes Peak, 1900, *F. Clements* (type); Windy Point, 1900; Mt. Harvard, 1896, *7;* Grecian Bend, 1896, Bottomless Pit, and Saddle, *Clements;* between Cheyenne Mountain and Seven Lakes, 1896, *E. A. Bessey;* Ironton, 1899, *C. C. Curtis;* Telluride, 1894, *F. Tweedy, 194;* Chambers Lake and Cameron Pass, 1896, *C. F. Baker;* Clear Creek Cañon, 1878, *M. E. Jones, 267;* Silver Plume, 1895, *Rydberg, 2460;* Pagosa Peak, 1899, *C. F. Baker, 233.*

Streptopus curvipes Vail sp. nov.

Simple, glabrous, except the margins of the leaves and the peduncles. Stems 1–3 dm. high, from a slender rootstock covered with few fibrous rootlets: leaves sessile, oval or oblong-lanceolate, 3–8 cm. long, acuminate at the apex, rounded and slightly clasping at the base, 3–5-nerved, the margins finely glandular-ciliate: flowers 3–5, solitary: peduncles not geniculate, 5–15 mm. long, glandular-pubescent: flowers pale purple or rose-colored: perianth-segments lanceolate, 5–7 mm. long, minutely glandular-pubescent on the inner surface: anthers 2-beaked; beaks slender, about half the length of the anther: style 3-cleft, the spreading branches stigmatic along the inner side: berry globose, when mature brick red, 7–9 mm. in diameter: seeds clavate, 3–4 mm. long, with many cross-striate ridges.

Differs from *Streptopus roseus* in its simple habit and the non-geniculate and much shorter peduncles. The beaks of the anthers seem to be a trifle longer than in *S. roseus.* It is closely related to *S. brevipes* Baker, but is larger and coarser in every respect. The flowers of the latter species are not known.

BRITISH COLUMBIA: Asulkan Pass, alt. 4400 ft., June to July,

1897, *Mrs. Zoë W. Palmer* (type); Glacier, alt. 4122 ft., June to July, 1897, *Mrs. Zoë W. Palmer;* Glacier, June, 1897, *Mr. & Mrs. Cornelius Van Brunt.*

ALASKA: Juneau, along the mountain side, July 24, 1891, *Miss Grace E. Cooley;* Yes Bay, July 10, 1895, *Thomas Howell, 1664* (all in Herb. N. Y. Botanical Garden or Columbia University); *Ferd. Bishoff.*

OREGON: *E. Hall, 521.*

WASHINGTON: Skamania Co., Aug., 1886, *Suksdorf;* Mt. Adams, 3–400 ft., *Suksdorf, 44;* June, 1879, *J. Howell* (the last five specimens in Herb. Gray).

Vagnera brachypetala sp. nov.

A tall stout perennial, 5–8 dm. high. Stem striate, puberulent, especially the upper portion: leaves subsessile or short-petioled, oval or ovate, 8–18 cm. long, 4–7 cm. wide, often short-acuminate and twisted at the apex, with 5–7 stronger nerves and numerous weaker ones: panicle on a peduncle 4–5 cm. long, rather dense, 3–10 cm. long and 2–5 cm. broad: petals and sepals oblong, 1–1.5 mm. long, scarcely half as long as the broadly dilated, lanceolate-subulate petaloid filaments: style about .5 mm. long: berry dark purple, about 6 mm. in diameter.

This species is closely related to *V. racemosa* and *V. amplexicaulis*, perhaps most nearly to the former, but is easily distinguished by the short petals and the purple fruit. In *V. racemosa* the petals and sepals are almost as long as the filaments and the fruit is 7–8 mm. in diameter and red with purple spots. *V. brachypetala* grows on hillsides up to an altitude of 2500 m.

BRITISH COLUMBIA: Glacier, at the "Loup," 1897, *Mr. & Mrs. Cornelius Van Brunt* (in fruit, type); Deer Park, Columbia River, 1890, *John Macoun;* Victoria, Vancouver Island, 1893, *John Macoun, 5998.*

WASHINGTON: Seattle, 1891, *C. V. Piper, 198.*

IDAHO: Lake Waha, 1892, *Sandberg, MacDougal & Heller, 228.*

Vagnera leptopetala sp. nov.

A slender glabrous perennial, 2–3 dm. high. Rootstock very slender for the genus, white, only about 2 mm. in diameter: stem erect, strict or the upper portion somewhat zigzag, striate and pale: leaves oblong-lanceolate, 6–8 cm. long, 1–2 cm. wide, light

green, sessile, long-acute, with 3–5 stronger nerves and 12–14 weaker ones: raceme terminal, simple, 3–6-flowered: pedicels 5–8 mm. long: petals and sepals linear, acute, about 4 mm. long and less than 1 mm. wide, very thin, white: fruit not seen.

This species is nearly related to *V. stellata* and *V. liliacea*, but differs in the narrow petals and sepals, the slender rootstock and the lighter green foliage. It grows in rich soil in cañons at an altitude of 2000–2100 m.

COLORADO: Headwarters of Sangre de Christo Creek, 1900, *Rydberg & Vreeland, 6441* (type); Dark Cañon, Pikes Peak, 1900, *Fred Clements.*

Limnorchis purpurascens sp. nov.

A rather stout plant, 3–5 dm. high, with fleshy-fibrous roots. Leaves ovate to lanceolate, acute, 6–10 cm. long, 1.5–3 cm. wide, dark green: bracts lanceolate, the lower exceeding the flowers: spike rather dense: flowers 10–12 mm. long: lateral sepals green, oblong-linear, or linear, obtuse, 4–5 mm. long; the upper sepal tinged with purple, broadly ovate, erect, obtuse: petals slightly shorter, erect, purple, lanceolate, oblique: lip broadly linear-lanceolate, about 5 mm. long, purplish, scarcely at all dilated at the base, the edges almost straight: spur scarcely more than half as long as the lip, much thickened and saccate.

This species belongs to the *L. hyperborea* group, and is perhaps nearest related to that species. It differs, however, in the purple petals and lip and the shorter and more saccate spur. The spur has almost the same form as that of *L. stricta*; but from that species it differs in the dense spike and the broader lip. *L. purpurascens* grows in damp woods at an altitude of 2700–3000 m.

COLORADO: Iron Mountain, 1900, *Rydberg & Vreeland, 6414* (type); Manitou, 1900, *Fred Clements, 172;* Georgetown, 1878, *M. E. Jones, 314.*

Piperia gen. nov.

Montolivaea Rydb. Mem. N. Y. Bot. Gard. **1**: 106. 1900. Not Reichenb.

Professor C. V. Piper of the Agricultural Experiment Station at Pullman, Washington, has called my attention to the fact that the genus *Montolivaea* was based not on *Platanthera elegans* Lindley, or *Habenaria elegans* Bolander; but on *Montolivaea elegans* Reich-

enb., or *Habenaria elegans* Jackson, of a much later date. The genus that I shortly characterized under the name of *Montolivaea* in the Memoir cited above, is therefore without a name. As I find that no genus has at yet been dedicated to Professor Piper, I take the pleasure in naming this for him. The genus contains at least three species, viz.

Piperia elegans (Lindl.)

Platanthera elegans Lindl. Gen. & Sp. Orch. 285. 1835.

Habenaria elegans Boland.; Wats. Bot. Calif. **2**: 133. 1876.

Montolivaea elegans Rydb. Mem. N. Y. Bot. Gard. **1**: 106. 1900. Not Reichenb.

Piperia Unalaschensis (Spreng.)

Spiranthes Unalaschensis Spreng. Syst. **3**: 708. 1826.

Habenaria Unalaschensis Wats. Proc. Am. Acad. **12**: 277. 1876.

Montolivaea Unalaschensis Rydb. Mem. N. Y. Bot. Gard. **1**: 107. 1900.

Piperia elongata sp. nov.

A slender strict plant, 4–7 dm. high. Corm ellipsoid, about 2 cm. long and 1 cm. in diameter: leaves 2, near the base; blades lanceolate or oblanceolate, acute, 8–15 cm. long, 1–2 cm. wide: spike elongated and lax, 2–3 dm. long: flowers about 1 cm. long: sepals green, about 5 mm. long, the upper lanceolate, the other two linear obtuse: petals lanceolate, oblique, equalling the sepals: lip entire, broadly lanceolate: spur slender, scarcely clavate, almost cylindrical, arcuate, 10–12 mm. long, about .7 mm. thick.

This is somewhat intermediate between the two preceding. It has almost the same flowers as the first and the general habit of the second. *P. elegans*, with which it has generally been confused, has a stouter, more fleshy stem, thicker bracts and a short crowded spike. *P. Unalaschensis* has the same habit as the present species, but the spur is very short and saccate. *P. elongata* grows in open woods, up to an altitude of 700 m.

IDAHO: Priest Lake, near lower end, 1900, *D. T. MacDougal, 168* (type); Priest River Valley, *134*.

WASHINGTON: W. Klickitat County, 1885, *W. N. Suksdorf;* Seattle, 1889, *C. V. Piper, 1081*.

Corallorrhiza Vreelandii sp. nov.

Scape rather stout, 2–4 dm. high, dark purplish brown. Sheaths, especially the lowest one, much inflated, purplish brown with dark purple striations: flowers 6–15, about 15 mm. long, in fruit drooping: sepals oblong, 7–8 mm. long, brown with 3 purple stripes: petals similar but slightly broader and with 4 stripes: lip ovate, entire, with a small gibbosity at the base: spur none.

This is nearest related to *C. striata*, from which it differs in the smaller flowers and narrower sepals and petals. The type was found growing among alders and willows at the margin of a small lake, at an altitude of about 2700 m. It was first discovered by Mr. F. K. Vreeland, my enthusiastic associate and pleasant companion in field work last summer.

COLORADO: Veta Mountain, 1900, *Rydberg & Vreeland, 6418.*

Salix Wyomingensis sp. nov.

A shrub 1 m. high or less. Bark of the main trunk gray; that of the branches dark-brown or grayish, shining, somewhat flaky; young branches appressed-villous; buds brown, shining, pubescent when young: leaves small, rather crowded; petioles 2–4 mm. long; blade oval or obovate, acute, 1–3 cm. long, entire or exceedingly minutely callous-denticulate, upper surface green and shining, slightly pubescent when young, glabrate in age; lower surface pale bluish green, appressed silky-villous: aments borne on very short leafy branches, about 3 cm. long, 8–10 mm. in diameter: bracts brown, oblong or ovate, obtuse: pedicels scarcely 1 mm. long: ovary villous, but green, when fully developed only about 3 mm. long: style .5 mm. long: stigmas short, slightly 2-cleft.

This species is nearest related to *S. glaucops* Anderson, but differs in the small oval or obovate leaves and the much smaller and greener ovaries. It grows at an altitude of 2100–2700 m.

WYOMING: Eastern Slope of Big Horn Mountains, headwaters of Clear Creek and Crazy Woman River, 1900, *F. Tweedy, 3434* (type) and *3433*.

Salix stenophylla sp. nov.

A shrub 2–5 m. high. Bark of older stems light brownish green, smooth; that of the slender strict branches brown: young shoots silvery pubescent: leaves narrowly linear, 3–7 cm. long, about 3 mm. wide, acute, entire or minutely and distantly denticulate, permanently finely silky strigose, but not white: pistillate

aments 3–4 cm. long at the ends of short leafy branches: bracts yellow, oblanceolate, deciduous, acute, 2–2.5 mm. long, rather sparingly silky-villous: pistil green, about 4 mm. long, glabrous except the swollen portion at the end just below the red stigma: stipe about 1 mm. long: style none: stigma minutely 4-lobed: fruit glabrous, narrowly ovoid-conic, about 6 mm. long, and 1.5 mm. in diameter: staminate aments 2–3 cm. long, 5 mm. in diameter: bracts like those of the pistillate aments, but more obtuse and more villous: stamens 2, about twice as long as the bracts: filaments slightly hairy, especially below.

This species is a member of the *longifolia* group and nearest related to *S. exigua* Nutt., at least as understood by Professor Rowlee; but differs in the narrower leaves, the distinct stipe and the peculiar swelling just below the stigma. It grows on river banks up to an altitude of 2500 m.

COLORADO: Cuchara River, below La Veta, 1900, *Rydberg & Vreeland, 6392* (staminate flowers) and *6393* (pistillate, type); Mancos, 1898, *Baker, Earle & Tracy, 127* (staminate) and *102* (pistillate in fruit).

NEW MEXICO: 1851–2, *Wright, 1874* and *1875*; 1847, *Fendler, 813*.

ARIZONA: San Francisco Mountains, 1881, *Rusby, 371*.

Salix padifolia sp. nov.

A shrub 1–7 m. high, with light brown smooth bark. Young twigs strict, glabrous and shining, yellow, or often brown or purple: stipules ovate or rounded, glandular-dentate: leaves with petioles 5–8 mm. long; blade oval or broadly elliptic, crenate, short-acute or obtusish, rounded at the base, 3–5 cm. long, 1.5–2 cm. wide, when young sparingly covered with silky hairs, but soon glabrate, dark green above, paler beneath: pistillate aments 3–4 cm. long, densely flowered, appearing usually before the leaves, borne on very short branches and subtended by 1–4 small leaves: bracts obovate, fuscous, covered on the outside with white wool: pistils nearly sessile, glabrous: style about 1.5 mm. long: stigmas 2, nearly 1 mm. long, 2-cleft: capsules ovate-conic, about 6 mm. long: staminate aments almost sessile, 2–3 cm. long, 10–12 mm. in diameter: bracts as those of the pistillate aments: stamens 2; filaments glabrous.

This is a species of the *cordata* group and nearest related to *S. Mackenziana*; but differs in the shorter oval leaves, the shorter and thicker aments and the exceedingly short stipes. It has gen-

erally been referred to *S. cordata*; but has much thicker and shorter aments and the leaves are quite different, thin, very short and broad, never acuminate and never sharply serrate. It grows along streams at an altitude of 2000–3000 m.

COLORADO: Tributaries of Turkey Creek, 1900, *Rydberg & Vreeland, 6389* (fruit, type); Ojo, *6386* (staminate) and *6387* (pistillate); Pass Creek, *6388* (pistillate); Los Pinos, 1899, *Baker, 271;* Bob Creek, 1898, *Baker, Earle & Tracy, 175;* Silverton, 1895, *F. Tweedy, 268* (?).

WYOMING: Golden Gate, 1899, *Aven & Elias Nelson, 5549.*

MONTANA: Ten miles east of Monida, 1899, *Aven & Elias Nelson, 5427.*

Salix flava sp. nov.

A shrub or small tree, 4–7 m. high, with grayish yellow rough bark. Branches short and divergent, light yellow, smooth and shining: stipules rounded, entire: leaves with petioles 2–6 mm. long; blades lanceolate, short-acuminate or acute, entire or indistinctly crenulate, rather firm, yellowish green, glabrous on both sides, 3–7 cm. long: pistillate aments 2–3 cm. long, almost sessile, subtended by 1–2 leaves or naked: bracts very short, obovate, fuscous, densely long-woolly: pistil stipitate, glabrous; stipe in fruit often 2 mm. long: style about .5 mm. long: stigmas oblong, subentire: capsule ovate, about 6 mm. long: staminate aments 2–3 cm. long, sessile: bracts as in the pistillate aments: stamens 2; filaments glabrous.

This is also a member of the *cordata* group and nearest related to *S. lutea* Nutt., differing in the less acuminate and subentire leaves, which are not paler beneath, and the longer stipes. It grows along streams at an altitude of 1500–2000 m.

WYOMING: Green River, 1895, *Rydberg* (type); Spread Creek, 1897, *F. Tweedy, 302.*

MONTANA: Boulder River, 1888, *F. Tweedy, 63.*

IDAHO: Beaver Cañon, 1895, *Rydberg.*

NEVADA: Unionville, 1868, *S. Watson, 1097.*

UTAH: Wahsatch Mountains, 1869, *S. Watson, 1096,* in part.

COLORADO: South Park, 1873, *J. Wolfe;* Cucharas Valley, near La Veta, 1900, *Rydberg & Vreeland, 6377;* Manitou, 1878, *M. E. Jones, 30.*

Blitum hastatum sp. nov.

A slender annual, 2–4 dm. high. Leaves very thin; blades

3–7 cm. long, ovate or ovate-lanceolate in outline, but often hastately lobed at the base, which is broadly cuneate and decurrent on the slender petiole; the upper ones smaller and generally not hastate: lower petioles 2–4 cm. long; flowers in small glomerules in the upper axils and on a slender interrupted terminal spike: seeds brownish black, smooth and shining, about 1 mm. long.

This species differs from *B. capitatum* in the hastate or entire, never toothed, thin leaves and in the inflorescence which is more inclined to be naked above, more lax and with smaller glomerules. It grows at an altitude of 2000–3000 m.

WYOMING: Buffalo, 1900, *F. Tweedy, 3295* (type).

UTAH: Alta, Wahsatch Mountains, 1879, *M. E. Jones, 1181.*

NEVADA: Above Thousand Springs Valley, 1868, *S. Watson, 977.*

Alsine Curtisii sp. nov.

Slender, erect, branched, 2–6 dm. high with a slender horizontal rootstock. Stem sharply 4-angled, glabrous, except at the inflorescence: leaves linear or lance-linear strongly 1-nerved, sessile, rounded and half clasping at the base, long-attenuate at the apex, 3–6 cm. long, 3–5 mm. wide, those of the inflorescence smaller: branches of the many-flowered cymes divergent, very viscid-pubescent: sepals about 3 mm. long, thick, ovate-oblong, obtuse or acutish with a narrow white margin: petals about 7 mm. long, cuneate with a broad and deep sinus at the apex: seeds very few, dark brown, almost 2 mm. in diameter.

This species is nearest related to *A. Jamesii* and has been confused with it; the differences are mostly in the leaves and sepals. In *A. Curtisii* the former are scarcely half as wide as those of *A. Jamesii*, and the sepals of the former are rather thick while in the latter almost membranous. *A. Curtisii* grows at an altitude of 1800 to 3000 m.

WYOMING: Headwaters of Cliff Creek, 1900, *C. C. Curtis* (type).

UTAH: Wahsatch Mountains, 1869, *S. Watson, 159* (in part); Beaver Valley, 1877, *E. Palmer, 51½*; Alta, Wahsatch Mountains, 1879, *M. E. Jones, 1160.*

NEVADA: East Humboldt Mountains, 1868, *S. Watson, 159* (in part).

ARIZONA: Mogallon Mountains, 1881, *H. H. Rusby.*

Arenaria confusa sp. nov.

A slender diffuse plant with cespitose, perennial, but not ligneous base. Stems slender, branched, 4–6 dm. long, finely puberulent: leaves opposite, linear-lanceolate, pointed, with a strong midrib, puberulent, 1–2 cm. long: pedicels in fruit divergent, about 1 cm. long, slightly bent under the calyx: sepals linear-lanceolate, acuminate, scarious-margined, not tuberculate-punctate, about 3 mm. long: petals about three fourths as long as the sepals: capsule broadly ovoid, about 4 mm. long.

This species is related to *A. lanuginosa* and *A. saxosa*, and somewhat intermediate between the two. In habit it resembles most the former, but does not have the subverticillate or fascicled leaves; the sepals are narrowly lanceolate instead of ovate and not tuberculate-punctate, the stem is not retrorsely pubescent as in that species and the petals are larger. In all specimens of *A. lanuginosa* seen by me the petals are either lacking or not more than half as long as the sepals. *A. saxosa* is subligneous at the base, has low stems, short leaves, mostly less than 1 cm. long and sepals even in flower 4–5 mm. long. Dr. B. L. Robinson, in the Synoptical Flora, remarks under *A. alsinoides* (*A. lanuginosa*): "A more western form, represented from New Mexico by Fendler's 58 and 62 and Wright's 864, has slightly firmer stems, more numerous subpaniculate flowers, and leaves less narrowed at the base. In all these respects it shows a transition to the following." I have not seen the numbers of Fendler's collection cited; but Wright's 864 as represented in Columbia University Herbarium belongs to *A. confusa*. On the sheet of Rusby's 38, cited below, found in the Columbia University herbarium, Dr. Robinson has written in pencil: "Apparently this is merely a lax form of *A. saxosa* Gray. The earliest leaves are crowded, the upper internodes much elongated, and later flowers are always smaller. (B. L. R.)" Wilcox's plant cited below was also determined by Dr. Robinson as *A. saxosa*. Both of these agree perfectly, however, with Wright's specimens; but neither with our material of *A. lanuginosa* from the Southern States and Mexico, nor with the type of *A. saxosa*. *A. confusa* grows in cañons at an altitude of 2000–3500 m.

NEW MEXICO: White Mountains, 1897, *E. O. Wooton, 295* (type); 1851, *C. Wright, 864;* Burrow Mountains, 1880, *H. H. Rusby, 38.*

ARIZONA: Ft. Huachuca, 1892, *T. E. Wilcox;* Rincou Mountains, 1891, *Neally, 119;* Flagstaff, 1894, *J. W. Toumey.*

COLORADO: La Plata Mountains, 1896, *F. Tweedy, 426;* Wahatoya Creek, 1900, *Rydberg & Vreeland, 6274;* Pagosa Peak, 1899, *C. F. Baker, 309.*

Delphinium ramosum sp. nov.

A tall perennial, often 2 m. high. Stem glabrous and shining up to the inflorescence, often tinged purplish or bluish: petioles 1–1.5 dm. long; leaf-blade glabrous above, finely puberulent beneath, divided near the base into 5–7 segments, which are 4–7 cm. long, oblanceolate or obovate, cuneate in outline, unequally 3-cleft and these segments again cleft into oblong or lanceolate lobes 3–6 mm. broad: inflorescence with slender branches, these sparingly and finely puberulent: bracts linear-subulate, 5–10 mm. long: pedicels slender, 1–3 cm. long: bractlets filiform, 2–5 mm. long, inserted 2–5 mm. below the calyx: sepals dark blue, striately nerved, slightly brownish at the base, about 1 cm. long, ovate; the upper and lower ones acute; the lateral ones obtuse, all puberulent: spur about 1 cm. long, straight, or slightly curved at the apex: upper petals dirty-white, tinged with brown and blue, about 8 mm. long: spur slender, almost 1 cm. long: lateral petals dark blue, bearded, with a slender claw, somewhat corniculate, bent at right angles and only slightly 2-lobed at the apex: follicles 3, 12–15 mm. long, somewhat spreading and with divaricate beaks.

This species has without doubt been included in *D. scopulorum*, but is evidently distinct from the type of that species. It is taller, with more branched inflorescence, glabrous stem and the flowers are usually tinged with brown at the base. The type of *D. scopulorum* has narrow, very acute and divergent lobes of the leaves and the calyx is purely dark blue. *D. ramosum* grows at an altitude of 2000–3000 m.

COLORADO: North Cheyenne Cañon, 1896, *E. A. Bessey* (type); also in Williams Cañon, Artists Glen and other places near Pikes Peak; "Colorado," 1889, *Alice Eastwood.*

Delphinium robustum sp. nov.

A tall and stout perennial, often 2 m. high or more. Stem leafy, striate, puberulent throughout, often 1 cm. in diameter at the base; petioles 1–2 dm. long, puberulent; leaf-blade finely and

sparingly puberulent on both sides, divided to the base into 5–7 segments, which are 6–12 cm. long and twice cleft into linear lobes 3–5 mm. broad: inflorescence branched, densely many-flowered: pedicels 1–3 cm. long, rather stout, usually equalled or surpassed by the linear bracts: bractlets filiform, 5–10 mm. long, inserted close under the calyx: sepals dark blue, paler at the base, elliptical, all except the upper one obtuse, 12–15 mm. long; spur 12 mm. long, slightly curved: upper petals narrow, light brownish, striate: lateral petals with slender claws bent at right angles, bearded only within, deeply 2-cleft at the apex.

This species in perhaps closest related to *D. cucullatum* A. Nelson but differs in the longer and narrower leaf-segments, the more branched inflorescence, the stouter habit, the longer bracts and bractlets and narrower upper petals. It grows at an altitude of about 2500 m.

COLORADO: Wahatoya Creek, below the Spanish Peaks, 1900, *Rydberg & Vreeland, 6217* (type); Colorado Springs, 1895, *E. A. Bessey;* Ruton, 1840, *Albert.*

Erysimum alpestre (Cockerell)

Erysimum asperum f. alpestre Cockerell, Bull. Torr. Club, **18**: 168. 1891.

A tall strigose perennial with a deep tap-root: stem strict, simple, 3–6 dm. high, striate: basal leaves linear or narrowly linear-oblanceolate, 5–10 cm. long, 2–7 mm. wide, subentire or sinuately denticulate, grayish strigose, gradually tapering below with a short petiole: stem leaves mostly narrowly linear, the upper sessile: raceme at first short and corymbiform, in fruit much elongated: pedicels short, in fruit scarcely 1 cm. long, ascending: calyx 10–12 mm. long, yellow: two of the sepals strongly saccate at the base: petals with slender claws: blades broadly obovate-cuneate, slightly emarginate, about 8 mm. long and broad, varying from orange or brown to rose-purple or the older pale yellow: pods four-angled, slender, erect, 7–8 cm. long and 1.5 mm. in diameter: style about 2 mm. long, stout.

In general habit, this species closely resembles *E. asperum.* Mr. Cockerell, who seems to have been the first to observe this interesting plant of the Sangre de Christo region, took it to be a form of *E. asperum* with peculiarly colored petals, found only at high altitudes. I was first of the same opinion until I saw the fruit in the type number and still better developed in Mr. Bessey's

specimens. This resembles more that of *E. asperrimum* (*Cheiranthus asperrimum* Greene) than that of *E. asperum*. The present species is also less densely and more finely strigose than either of them. *E. alpestre* grows at an altitude of 2500 m. or more.

COLORADO: Headwaters of Pass Creek, 1900, *Rydberg & Vreeland, 6200* (type); mountain near Veta Pass, *6199*; Veta Mountain, *6197*; tributary of Turkey Creek, *6198*; East Indian Creek, *6196*; Ojo, *6202*; Bald Mountain, near Pikes Peak, 1896, *E. A. Bessey*.

Draba aureiformis sp. nov.

A slender grayish stellate plant with perennial tap-root: stem strict, 2–4 dm. high, simple or branched above, with slender erect branches: basal leaves spatulate, 2–3 cm. long, acute, entire: stem-leaves closely sessile, oblong-lanceolate, acute, entire or sinuately denticulate: petals sulphur yellow, 3–4 mm. long, broadly spatulate: pedicels ascending: pod erect, linear-oblong-lanceolate, 10–15 mm. long, about 3 mm. wide, slightly if at all twisted, stellate: style about 1 mm. long.

This species is nearest related to *D. aurea*, but characterized by the small light yellow petals, the slender style, the less dense pubescence, and slender stem. It grows in dry soil at an altitude of 2700–3300 m.

COLORADO: Headwaters of Pass Creek, 1900, *Rydberg & Vreeland, 6157* (type); Middle Park, 1861, *C. C. Parry, 103*; Graymount, 1885, *G. W. Letterman, 28*.

Physaria vitulifera sp. nov.

A densely tufted finely stellate-pubescent perennial with deep tap-root. Basal leaves numerous, fiddle-shaped, the larger 4–5 cm. long; terminal lobe nearly orbicular to broadly obovate, subentire, obtuse; upper sinuses rounded: lateral lobes 1–2 pairs, much smaller: stems ascending, or decumbent, 1–2 dm. high: stem-leaves 1–2 cm. long, obovate or oblanceolate, entire: pedicels short, usually curved in fruit: sepals about 4 mm. long, oblong, acute: petals clawed, 8–9 mm. long: fruit obtuse at the base, deeply divided above; cells much inflated, round-obovate, divergent, about 5 mm. in diameter: style about 5 mm. long.

This species, as well as the two following, differs from *P. didymocarpa* in the smaller fruit, which is divided only above, not at

the base. In this respect they resemble *P. Newberryi;* but the fruit is much smaller and not flattened on the sides. *P. vitulifera* differs from the following in the form of the leaves and the curved pedicels. It grows in dry places at an altitude of about 2500 m.

COLORADO: Idaho Springs, 1895, *P. A. Rydberg* (type); Middle Park, 1861, *C. C. Parry, 101.*

Physaria floribunda sp. nov.

Densely tufted perennial with thick tap-root. Flowering stems very numerous, ascending or almost erect, 1–2.5 dm. high: basal leaves less crowded and more erect than in the preceding, oblanceolate or spatulate, sinuately toothed, acute, 5–10 cm. long: stem-leaves oblanceolate, entire, about 3 cm. long: sepals about 5 mm. long, linear-lanceolate: petals bright yellow, 8–9 mm. long, oblanceolate with broad claws: fruit obtuse or slightly cordate at the base, deeply divided above: cells much inflated, about 8 mm. in diameter, almost globular: style 6 mm. long.

In the size and form of the fruit, this species is intermediate between the preceding and *P. didymocarpa;* but it is taller than either. Sometimes the leaves are deeper sinuate, and then become slightly fiddleform; but the terminal lobe is sinuately toothed and acutish. From *P. didymocarpa* it differs in the smaller fruit, which is less cordate at the base, and the longer, more acute leaves. It grows in loose sandy soil in mountain valleys at an altitude of 2000–2700 m.

COLORADO: Sangre de Christo Creek, 1900, *Rydberg & Vreeland, 6135* (type) and *6136;* Hills about Golden, 1892, *Crandall, 53.*

Physaria acutifolia sp. nov.

A small tufted perennial with a deep rather slender tap-root. Basal leaves numerous, 1.5–2.5 cm. long, oblanceolate or obovate, acute, entire or slightly wavy, very finely stellate: stem-leaves rather few, oblanceolate: flowering stems 4–6 cm. long, ascending or depressed: fruit small, obtuse or slightly cordate at the base, deeply divided above: cells inflated, almost spherical, 4–6 mm. in diameter: style about 5 mm. long.

This species differs from *P. didymocarpa* in the smaller size, in the acute leaves, and the smaller fruit, which is more deeply divided above and less so below. In general habit it resembles more *P. Geyeri,* from which it differs in the turgid more spherical cells. It grows in the mountains, reaching an altitude of 3000 m.

COLORADO: Grand Junction, 1893, *Alice Eastwood* (type).
WYOMING: Mount Leidy, 1897, *F. Tweedy, 391.*

Cardamine cardiophylla sp. nov.

Stem stout, 3–10 dm. high, densely hirsute with short white hairs, almost pilose: leaves rounded-cordate or the lower reniform, simple, coarsely sinuately toothed: blades 3–4 cm. broad, more or less pubescent: petioles more or less densely pilose, those of the basal leaves 5–8 cm. long, those of the upper stem-leaves very short: sepals also pubescent, about 3 mm. long: petals white, broadly spatulate, about 8 mm. long: pedicels in fruit spreading, 1.5–2 cm. long: pods 2.5–3.5 cm. long, ascending, 1.5 mm. wide.

This species is nearest related to *C. cordifolia*, and differs mainly in the thicker leaves and the dense pubescence. It reaches an altitude of 3300 m.

COLORADO: Tennessee Pass, Lake County, 1900, *Geo. E. Osterhout, 2178* (type); 1893, *De Alton Saunders;* Camp beyond Bent's Fort, 1845, *Fremont, 429.*

Thlaspi Coloradense sp. nov.

Perennial; rootstock or caudex cespitose, the branches rosuliferous at the apex. Basal leaves broadly spatulate, 1–2 cm. long, fleshy, 4–7 mm. wide, sinuately crenate or subentire: flowering stems 2–8 cm. long, leafy: stem-leaves oblong or obovate, 3–10 mm. long, obtuse: inflorescence short and dense, even in fruit seldom over 2 cm. long: sepals rounded-ovate, obtuse, with a white margin, about 2 mm. long: petals large, obovate-spatulate, 5–6 mm. long: silicle obovate, about 6 mm. long, only slightly emarginate at the apex: wing-margins very narrow; carina on the sides rather prominent: seeds red, about 1 mm. long.

This species has been included by American authors in *T. alpestre*, which is not found in America. The European species has very small flowers and a different pod which is obcordate with a narrow and deep sinus at the apex. Professor Greene has determined *T. Coloradense* as *T. Fendleri* Gray. The latter was described from flowering specimens and might be the present species; at least it is much like it. Specimens in fruit from the same region as the type of *T. Fendleri* were collected later and were referred by Dr. Gray to *T. Fendleri;* in these the fruit is larger, decidedly inverted triangular in outline, broader margined at the corners and almost truncate at the apex.

T. Coloradense grows at an altitude of 2500 m. or more, among rocks.

COLORADO: Bald Mountain near Pikes Peak, 1896, *E. A. Bessey* (type); South Cheyenne Cañon, Colorado Springs, 1900, *Rydberg & Vreeland, 6126;* West Spanish Peak *6127* and *6128;* Pikes Peak, 1894, *E. A. Bessey;* Pikes Peak and Baldy, 1896, *F. Clements;* Pikes Peak and Tennessee Pass, 1893, *De Alton Saunders;* Laramie County, 1893, *C. S. Crandall,* 60; Pikes Peak, 1891, *Dr. E. Penard, 54;* Arapahoe, *55;* Los Pinos, 1899, *C. F. Baker;* Cheyenne Mountain and Seven Lakes, 1896, *E. A. Bessey.*

Thlaspi purpurascens sp. nov.

Perennial with a tap-root crowned by a very short caudex and a rosette of leaves; flowering stems generally several, less than 1 dm. high: basal leaves oval or broadly spatulate, 2–3 cm. long, petioled, usually more or less sinuate-dentate: stem-leaves ovate, obtuse, with a truncate base, closely sessile: sepals 2.5–3 mm. long, oblong-oval, obtuse, purplish with broad white margins: petals broadly spatulate, about 6 mm. long: silicle triangular-obovate, distinctly winged above and with a very broad and shallow sinus at the apex, 7–8 mm. long.

This species is closely related to the preceding and intermediate forms are not lacking. The principal difference is in the fruit, which in *T. purpurascens* is comparatively broader, distinctly winged and with a broad and open sinus at the top, almost truncate and less keeled on the sides. The sepals in all specimens seen are purplish and broader, the stem leaves are larger, more ovate and usually with a truncate base, and the branches of the caudex are very short.

ARIZONA: 1876, *E. Palmer, 571* (type); San Francisco Mountains, 1881, *H. H. Rusby, 28;* 1887, *Dr. E. A. Mearns, 34;* Flagstaff, 1898, *D. T. MacDougal, 228.*

COLORADO: Headwaters of Sangre de Christo Creek, 1900, *Rydberg & Vreeland, 6125;* Iron Mountain, *6124.*

Sophia glandulifera sp. nov.

Biennial. Stem simple below, branched above, about 6 dm. high, slightly grayish pubescent with branched hairs, decidedly glandular-viscid above; branches spreading, with upwardly curved ends: leaves pubescent and viscid, bipinnately divided; segments

linear-lanceolate or of the upper leaves filiform, acute or attenuate: flowers light yellow: petals scarcely exceeding the sepals: pedicels very short in flower; in fruit 4–6 mm. long, ascending or almost erect: pods 8–10 mm. long, erect, more or less curved, especially those of the branches, scarcely exceeding 7 mm. in width, more or less constricted between the seeds; beak slender, short, about .5 mm. long: seeds uniserial, red, a little over 1 mm. long.

This species has the short pedicels and erect pods of *S. Hartwegiana*, but the pod of the latter is more slender, and often curved, the whole plant is greener and conspicuously glandular, and the segments of the leaves are more slender. The latter character and the short ascending or erect pedicels distinguish it from *S. incisa* Engelm. It grows at an altitude of 1000–1500 m.

WYOMING: Rolling plains between Sheridan and Buffalo, 1900, *F. Tweedy, 3592.*

Sedum frigidum sp. nov.

Perennial with a fleshy rootstock, dioecious. Stems usually less than 1 dm. high, light green: leaves flat, 1–1.5 cm. long and 5–7 mm. wide, sessile, obovate or oblong-obovate, often dentate above the middle, or entire, acute: inflorescence dense, usually dark purple: flowers 4–5-merous, usually 5-merous: sepals of the staminate flowers lanceolate, acute, 1.5–2 mm. long, dark purple or rarely greenish: petals oblanceolate or oblong, acute, about 3 mm. long, dark purple or very rarely greenish tinged with purple: filaments filiform, purple, about one third longer than the petals, the pistillate similar but with somewhat shorter and more obtuse petals: follicles 3–5 mm. long, oblong, with a very short beak about .5 mm. long, divergent or at last recurved.

This species has gone under the name of *S. roseum* (L.) Scop., but is quite unlike the northern European plant, which must be regarded as the type of *Rhodiola rosea* L. This has a very short, almost tuberous rootstock, more oblanceolate leaves about 3 cm. long, usually with very sharp dentations, usually yellow petals, longer filaments almost twice as long as the petals and follicles, 6–8 mm. long. This form is also found in the mountains of southern Europe; but there seems to be another European plant; this is described and figured under the name *Rhodiola rosea* in the "Flora von Deutschland" published by Schlechtendal, Langethal and Schenk. It resembles more the Rocky Mountain plant in the purple, flowers and short stamens, but it has more inversely deltoid leaves,

the fertile flowers have very minute petals or none and the follicles have long beaks. In all systematic botanies of Scandinavia and Russia, *S. roseum* is described as having yellow petals, which is never the case in the Rocky Mountain and Alaskan plants. In this respect plants from eastern North America agree with the European.

S. frigidum is an alpine-arctic plant growing in Colorado at an altitude of 3000 m. or more. In Montana it is found at an altitude of about 2700 m. and in Alaska at low altitudes. It grows among rocks, associating with several species of *Saxifraga* and *Adoxa Moschatellina*.

MONTANA: Old Hollow Top, 1897, *Rydberg & Bessey, 4248* (type); Long Baldy, 1896, *Flodman, 513;* Haystack Peak, 1899, *P. Koch.*

COLORADO: West Spanish Peak, 1900, *Rydberg & Vreeland, 6112* (♀); *6114* (♂) and *6115* (with greenish, merely purple-tinged flowers); Grayback Mining Camp, *6116;* Pikes Peak, 1900, *F. Clements;* 1821, *Dr. James;* Arapahoe Peak, 1891, *Dr. E. Penard;* Pikes Peak, 1894, *E. A. Bessey;* 1893, *De Alton Saunders.*

NEVADA: Mineral King, Sierra, Nevada, 1891, *Coville & Funston, 1529.*

IDAHO: Packsaddle Peak, 1892, *Sandberg, MacDougal & Heller, 860.*

WASHINGTON: Mt. Paddo, 1886, *W. H. Suksdorf, 859.*

ALASKA: Muniak Island, 1891, *Jas. M. Macoun, 48;* Shumagin, 1871–1872, *M. W. Harrington*; King Island, 1897, *E. A. McIlhenny, 83.*

Sedum polygamum sp. nov.

Perennial with a thick fleshy rootstock. Stem 1–3 dm. high: leaves obovate or oblanceolate, acute, sessile, flat, entire or minutely denticulate, 1.5–2.5 cm. long: inflorescence dark purple, dense: flowers dioecio-polygamous: sepals of the staminate ones lanceolate, 2 mm. long, acute: petals oblanceolate, dark purple, about 3 mm. long: filaments about half longer than the petals, purple, broader than in the preceding species, abruptly acuminate above: fertile flowers with more lanceolate petals and usually with stamens which however have shorter filaments scarcely exceeding the petals: follicles 6–8 mm. long with an ascending or spreading beak, about 1 mm. long.

This species is closely related to the preceding, but is stouter, the fertile flowers usually with stamens, the follicles larger and with less divaricate beaks. It has also been included in *S. roseum*, but is really nearer related to *S. atropurpureum* of eastern Asia, which however has larger leaves. *S. polygamum* grows at an altitude of 3000 m. or more.

COLORADO: West Spanish Peak, *1900, Rydberg & Vreeland, 6113* (type); Silverton, 1895, *F. Tweedy 124;* Mt. Hesperus, 1898, *Baker, Earle & Tracy, 481;* Basin Creek, La Plata Mountains, *480;* Mt. Lincoln, 1873, *J. M. Coulter;* Chambers Lake, 1894, *C. S. Crandall.*

NEW MEXICO: White Mountains, 1897, *E. O. Wooton, 677.*

Structure and Nature of Tremella mycetophila Peck.

By Edward A. Burt

(With Plate 23)

During protracted wet weather in August, *Tremella mycetophila* Peck is occasionally found in northern New York and Vermont on the stems and pilei of *Collybia dryophila*. Its fructifications occur as distortions on the host plant and are conspicuous and characteristic, as shown in Fig. 1, which is a copy of the illustration given with the original description.* These distorting fructifications sometimes become an inch in diameter (Fig. 2) and are then thin-walled, hollow sacs, as shown in section in Fig. 3.

In the original description, the fructifications are stated to be tremelloid-fleshy, but this term seems to me to be applicable only to old specimens collected during rainy weather; under more normal conditions the fungus is simply fleshy. That the substance is fleshy rather than tremelloid or gelatinous is shown also by the dried specimens, which do not assume the appearance of dried gum or resin upon drying and do become soft and pliant much more readily upon being moistened than is the case with tremelloid species.

Several collections of *Tremella mycetophila* which have been made in recent years and an especially fine specimen contributed by Professor Peck last August, while we were at Floodwood, N. Y., and preserved in alcohol, have made it possible to supply the microscopical characters for this fungus and to give its generic location on the basis of this more complete knowledge of its nature.

Vertical sections of the fructifications show at the surface a hymenium consisting of basidia of the usual simple, cylindric type, 40 × 5–7 μ, each bearing at its outer end on short sterigmata four hyaline spores (Figs. 4, 5). These basidiospores are even, inequilateral or slightly curved, 5–7 × 1½–2½ μ (Fig. 6); they are white when collected in quantity on a glass slip.

* Rep. N. Y. Mus. **28**: 53. *pl. 1. f. 4.* 1879.

The deeper tissue from which the basidia arise, consists of compactly arranged, sharply outlined, even-walled, cylindric hyphae and of innumerable minute conidial spores, which occupy the spaces between the hyphae (Fig. 7). The hyphae are usually 3–5 μ in diameter but with some slender branches (Fig. 8). Clamp connections are sometimes, but not usually, present at the septa.

The conidia are hyaline, even, about 2 × 1 ½ μ (Fig. 9). They are present in abundance in the specimens which I have collected during eight seasons in the widely separated localities, East Galway and Floodwood, N. Y., and Ripton, Vt., but are most abundant in comparison with the basidiospores in the large fructification of Figs. 2 and 3; they are perhaps always produced by this species.

It has been difficult to make out the mode of origin of the conidia on account of their minute size and position between crowded hyphae. I have found, however, that if thin sections, cut free-hand, are stained in a saturated alcoholic solution of eosin and then mounted in water and potassium hydrate after washing away the superfluous eosin, the tissues of these sections will retain their intense red color for half an hour or longer and may be dissociated sufficiently for study by gentle pressure on the cover-glass. By the examination of such preparations with a $\frac{1}{12}$-in. objective, the conidia are seen to be formed in bead-like chains by the constriction of the smaller hyphal branches (Figs. 10, 11).

Reference is not often made to the production of a crop of conidia in addition to the basidiospores regularly produced by a toadstool, yet several instances are known in the Tremellaceae, Agaricaceae and Polyporaceae and they do occur occasionally in the Thelephoraceae, I find. They should not be regarded as entitling the present fungus to special generic rank.

The genus *Tremella* has basidia longitudinally and cruciately divided and subhymenial hyphae with the outer portion of the cell wall indistinct through gelatinous modification; the fructifications as a whole are also distinctly gelatinous and even tremulous in wet weather. The fungus under consideration can not therefore be a *Tremella;* in fact its structural characters are such that it should not be included in the Tremellaceae but in the Thelephoraceae, provided the distortions are not merely monstrous growths of *Collybia dryophila* itself—which I do not believe after microscopic

comparisons with the lamellae of *C. dryophila.* I would transfer the fungus to the genus *Exobasidium*, with the original description of the species changed as follows:

EXOBASIDIUM MYCETOPHILUM (Peck) Burt

Tremella mycetophila Peck, Rep. N. Y. Mus. **28**: 53. *pl. 1. f. 4.* 1879.

Suborbicular, depressed, gyrose-plicate, fleshy, slightly pruinose, yellowish or pallid, .35–1 inch broad; basidia simple, cylindric, 4-spored: basidiospores simple, hyaline, even, inequilateral or slightly curved, 5–7 × 1.5–2.5 μ; conidia simple, hyaline, even, 2 × 1.5 μ, concatenate at the ends of slender subhymenial hyphae. (Plate 23.)

On stem and pileus of *Collybia dryophila*, August.

NEW YORK: Oneida, *Warne;* North Elbe, and Floodwood, *Peck;* East Galway and Floodwood, *Burt;* Syracuse, *Underwood;* New York, *Cushier.*

NEW HAMPSHIRE: Shelburne, *Farlow.*

VERMONT: Ripton, *Burt.*

MIDDLEBURY COLLEGE, MIDDLEBURY, VT.

Explanation of Plate

FIG. 1. Three fructifications of *Exobasidium mycetophilum* on *Collybia dryophila*, natural size (after Peck).

FIG. 2. A large fructification of *E. mycetophilum*, nat. size; and Fig. 3, a longitudinal section through the same and the stem, *s.* of *C. dryophila.*

FIGS. 4 and 5. Basidia bearing basidiospores, × 1140.

FIG. 6. Three basidiospores, × 1760.

FIG. 7. Part of a section, showing groups of conidia, *c*, between the hyphae of the deeper tissue of the fructification, × 500. Fig. 8. Portion of a hypha, showing slender branches.

FIG. 9. Conidia, a connected group of four at the left, × 1760.

FIG. 10. A conidium borne at the end of a slender hypha, × 1140.

FIG. 11. A chain of four conidia at the end of a slender hypha which lies between coarser hyphae, × 1760.

An undescribed Species of Paronychia from California

By Alice Eastwood

Paronychia Franciscana sp. nov.

Perennial from a woody tap-root, with the thread-like fibers numerous: stems wiry, slender, diffusely spreading, prostrate, forming mats often 4 dm. in diameter, branching about midway, glabrous, with internodes 2–15 mm. long, generally shorter than the leaves or even the stipules: lower part of stems simple with knotted nodes which are without leaves but generally with ragged, persistent stipules: leaves opposite, oblong-linear, 5–8 mm. long, 1–2 mm. wide; apex tipped with a callous point and a weak bristle, the latter about 1 mm. long; base tapering to a short petiole which is horny at its intersection with the stipules; surface more or less clothed with a stiff, scattered, upwardly spreading pubescence of short hairs papillate at base and forming cilia on the margins, veinless except for the midrib which is elevated on the lower side: stipules silvery scarious, thin, tapering to a weak filiform apex, ciliate-laciniate on the margin, 2–2.5 mm. wide at base, 5–6 mm. or more long, thickened at base and together with the hardened bases of the petioles forming a horny ring around the stem at the nodes: flowers few in the axils on very short pedicels which are 1 mm. or more in length: calyx 2 mm. long, green or purplish, with 5 somewhat unequal divisions; these connivent, oblong, veiny with a prominent midvein and a simple or branched one on each side; apex cucullate on the three narrower divisions, less so on the two broader, tipped with a spine .5–2 mm. long, rather densely hairy at summit, glabrous below except at the very base: stamens minute with short slender filaments and biglobular anthers: ovary orbicular, styles 2: fruit a utricle with thin membranous papillate coat, loosely investing the flat round brown seed which is attached and almost encircled by a ribbon-like funiculus having a central vein.

This species is common on grassy hillocks at the Presidio, San Francisco, from which there are specimens in the herbarium of the California Academy of Sciences, collected by Dr. E. L. Greene, Mrs. Brandegee, and Miss Evelina Cannon; also one from Bodega Port collected by the writer.

This species was identified with *Paronychia Chilensis* DC., by Dr. E. L. Greene, in West American Scientist, **3**: 156.

While engaged in identifying the plants collected by the author at Bodega Port, the error was discovered. On consulting the original description the Californian specimens were found to be dissimilar. An inspection of the herbarium disclosed two different species both marked *P. Chilensis* DC. and both from the Province of Aconcagua, Chili. Specimens were sent to the Gray Herbarium but they were unable to look into the matter though they kindly sent some scraps of the species collected by C. Gay, the author of a Flora of Chili. This only served to deepen the mystery, so specimens were sent to the Royal Herbarium at Kew.

The following note from Dr. Otto Stapf clears the whole matter. "Of the two Chilian specimens named *P. Chilensis*, the one having smaller flowers and submuticous sepals is the true *P. Chilensis* DC. It agrees very well with a specimen from Concepcion (the locus classicus of this species) in our herbarium and corresponds to the description in DC. Prodr. **3**: 370, with the exception that it is more pubescent.

"The other specimen which, in my opinion, is identical with the plant from San Francisco is *P. Chilensis, C. Gay, non DC.* Rohrbach pointed out Gay's mistake in Fl. Bras. **14**^{2}: 254; but he was wrong in referring it to *P. Brasiliana* DC., although it is certainly nearly allied to it. I am not aware of any distinct name for it. Lechler distributed it as *P. Chilensis* var. *setigera* Fenzl, but Fenzl does not seem to have published a description of it. I might perhaps mention that there is a *Herniaria setigera* Gill., which is a true *Paronychia*, and certainly distinct from *P. Chilensis* C. Gay."

Shrubs and Trees of the Southern States.—III.

By John K. Small

1. HITHERTO UNDESCRIBED SPECIES

Prunus Cuthbertii

A tree 6 m. tall and sometimes 1.5 dm. in diameter near the base, with tomentose twigs. Leaf-blades leathery, normally obovate, varying to oval or fiddle-shaped, 4–9 cm. long, blunt or notched at the apex, shallowy serrate, not markedly biglandular at the often cuneate base, dull green above, pale or glaucescent beneath, the midrib and petioles copiously tomentose and the lateral veins slightly so: racemes 5–8 cm. long, terminating short leafy branches, the rachis and pedicels pubescent like the twigs: pedicels clavate, 3–5 mm. long during anthesis, becoming 8–11 mm. long: sepals broader than long, obtuse, shorter than the hypanthium: petals suborbicular, about 2 mm. in diameter, crisped: drupes subglobose, mostly 8–9 mm. in diameter, red.

In rich woods, near Augusta, Georgia.

A relative of *Prunus serotina* differing in the decidedly obovate blunt leaf-blades and the tomentose glandless petioles and tomentose veins of the blades and the similarly pubescent racemes. The flowers are smaller and the very blunt sepals are much broader than the acute sepals of *P. serotina*. The fruit also furnishes a character in its decidedly red color. The original specimens were collected by Mr. A. Cuthbert in the vicinity of Augusta, Georgia, on July 17, 1898, and June 2, 1899. Type in the herbarium of the New York Botanical Garden.

Leucothoë platyphylla

A straggling shrub 0.5–1 m. tall, with spreading and drooping branches. Twigs and branches finely pubescent: leaf-blades suborbicular to oval, broadly oblong or oblong-ovate, 5–8 cm. long, abruptly pointed or slightly acuminate, serrate with very fine spinulose teeth, especially above the middle: petioles stout, 4–8 mm. long, pubescent: racemes 2–5 cm. long, the rachis pubescent like the twigs: pedicels 3–5 mm. long: calyx glabrous; longer sepals orbicular-ovate: corolla white, 6–8 mm. long: capsule 5.5 mm. broad, 4 mm. high.

In low thickets, Georgia to Alabama. Spring.

Leucothoë platyphylla differs from *L. axillaris* in its broader leaf-blades, orbicular larger sepals, smaller corollas and larger capsules.

The specimens on which the species is founded were collected by the writer near the Ochlockonee River about Thomasville, Georgia, in May and June, 1895. Type in the herbarium of Columbia University.

Hypericum splendens

An erect much branched shrub 0.5–1.5 meters tall, with 2-edged glaucous twigs. Leaves firm, numerous; blades oblong, 1.5–2.5 cm. long, obtuse or rounded at the apex, slightly revolute, glaucous, especially beneath, narrowed at the sessile base: buds conic: flowers very showy, several or many in terminal or axillary cymes: sepals unequal, oblong, firm, apiculate, the outer about 8 mm. long, the inner 5 mm. long: corollas 3.5–4 cm. broad: petals golden, cuneate, oblique, 1.5–2 cm. long: stamens very numerous, orange-colored: styles 3, slender: capsules often crowded, conic, 1.5 cm. high, acuminate at the apex, partially 3-celled, about thrice as long as the sepals with 3 narrow wings and 6 obtuse angles: seeds cylindric, 1.3 mm. long, longitudinally ribbed and transversely wrinkled, resembling ears of corn.

On granite slopes, Stone Mountain, Georgia. Summer.

This is perhaps the most showy North American *Hypericum* and is related to *H. aureum* from which it differs in the smaller firmer leaves, the more distinctly pedicelled flowers and the conic buds.

The original specimens were collected by the writer on Stone Mountain, Georgia, in July and August, 1893, and August 6, 1895. Type in the herbarium of Columbia University.

2. THE GENUS PTELEA IN THE SOUTHEASTERN UNITED STATES

PTELEA L.

The genus *Ptelea* differs from *Helietta*, its only close relative in North America, in its pubescent filaments, and in the fruit which is winged all around and does not separate into distinct carpels.

Key to the Species

Parts of the flower usually in 5's: leaflets relatively small.

Filaments slightly pubescent at the middle: petals glabrous within: Floridian.

1. *P. Baldwinii.*

Filaments pubescent throughout: petals pubescent within: Texano-Mexican. 2. *P. angustifolia.*

Parts of the flower usually in 4's: leaflets relatively large.

Samaras obovate.

Leaflets with sharply serrate blades: samaras 16–19 mm. long, acute at the base, the body merely glandular-dotted. 3. *P. serrata.*

Leaflets with entire or merely undulate blades: samaras 8–11 mm. long, or rarely longer, rounded or truncate at the base, the body pitted. 4. *P. microcarpa.*

Samaras suborbicular.

Leaflets with entire or merely crenulate blades, the terminal one much longer than broad, acute or slightly acuminate. 5. *P. trifoliata.*

Leaflets with crenate or crenate-lobed blades, the terminal one only slightly longer than broad, blunt.

Blades of the leaflets not lustrous: filaments nearly glabrous: anthers rounded or retuse at the apex. 6. *P. rhombifolia.*

Blades of the leaflets lustrous above: filaments densely pubescent below: anthers apiculate. 7. *P. Toxicodendron.*

1. PTELEA BALDWINII T. & G.

A shrub about 3 dm. tall, with irregularly branched stems. Leaflets 3; blades oval or ovate, 1–2 cm. long, obtuse at both ends, or the terminal one cuneate at the base, sessile, glabrous except the midrib and the ciliate margins when they are young: panicles few-flowered: flowers with the parts mostly in 5's: calyx 1.5 mm. broad: sepals oval, less than 1 mm. long, acutish, ascending: petals 4, oblong-oblanceolate, 4 mm. long, obtuse, undulate: stamens shorter than the petals: filaments stout, hairy at the middle.

In the vicinity of St. Johns, eastern Florida. Spring.

2. PTELEA ANGUSTIFOLIA Benth.

A little known species originally described from Mexico, with pubescent foliage, wholly pubescent filaments and pubescent petals, is said to occur in southern and western Texas.

3. **Ptelea serrata** sp. nov.

An irregularly branched shrub, 1–2 m. tall, with glabrous foliage. Leaflets 3; blades thinnish, oval, elliptic or elliptic-obovate, 2.5–7 cm. long, sharply acuminate, or rarely only acute, rather shallowly but sharply serrate, deep green above, very pale green beneath, the terminal one with a slender base: panicles few-flowered: samaras obovate, 16–19 mm. long, acute at the base, the wing rather delicate, the body glandular-dotted.

On granite slopes, Stone Mountain, Georgia. Spring.

Ptelea serrata is not closely related to any described species. It differs from the other species in the sharply acute or acuminate and sharply serrate blades of leaflets and the obovate samaras with their acute bases.

The specimens on which the species is founded were collected by the writer on Stone Mountain, Georgia on July 3, 1893. Type in the herbarium of Columbia University.

4. **Ptelea microcarpa** sp. nov.

A shrub 1.5–3 m. tall, with branching stems and glabrous foliage. Leaflets 3; blades firm, elliptic, oval or oblong-lanceolate, 4–10 cm. long, bluntly pointed or acutish, often slightly acuminate at both ends, entire or nearly undulate, slightly paler beneath than above, the terminal one not conspicuously narrowed at the base: panicle many-flowered: samaras suborbicular or orbicular-obovate, 8–11 mm. in diameter, or rarely larger, rounded or truncate at the base, the wings slightly crisped, the body pitted.

On limestone or granite ridges, Tennessee, Georgia and Alabama. Spring.

Ptelea microcarpa is most closely related to *P. serrata*, but differs in the firmer longer entire or merely undulate blades of the leaflets, and the samara with its pitted body, and the wing which is rounded or truncate at the base.

The original specimens were collected by officers of the Biltmore Herbarium (no. 4437[b]), at Nashville, Tennessee, August 9, 1897. The type is in the herbarium of the New York Botanical Garden.

5. PTELEA TRIFOLIATA L.

An aromatic shrub or tree sometimes 8 m. tall, the foliage glabrous or sometimes densely pubescent. Leaflets 3; blades ovate, oval, elliptic, oblong, oblong-lanceolate or oblanceolate, 4–12 cm. long, acute or acuminate, entire or sometimes undulate or partially crenulate: panicles many-flowered: sepals ovate, 1.5 mm. long, obtuse: petals narrowly oblong, 4–5 mm. long: samaras suborbicular or oval-orbicular, 2–2.5 cm. long, rounded or notched at the base.

In rich soil and on river banks, Long Island to Ontario, Minnesota, Florida and Texas. Spring. The form with pubescent foliage is *Ptelea trifoliata mollis* M. A. Curtis and is most common in the Gulf States.

6. PTELEA RHOMBIFOLIA Heller

A shrub 2–2.5 m. tall, branching above, the foliage densely pubescent. Leaflets 3; blades rhombic-ovate to rhombic-orbicular, 2.5–5 cm. long, blunt, crenate, dull green above, the terminal one but little longer than broad: petals pubescent without, about 4 mm. long: filaments slightly pubescent near the base: samaras nearly orbicular, 1.5–2.5 cm. broad.

In open woods, southern Texas. Spring.

7. **Ptelea Toxicodendron** sp. nov.

A branching shrub 1–2 m. tall, with glabrous foliage. Leaflets 3; blades oval or rarely oval-ovate, 1.5–6 cm. long, rounded or blunt at the apex, crenate or somewhat crenate-lobed, dark green and lustrous above, slightly paler beneath: panicles few-flowered: petals about 5 mm. long, glabrous: filaments densely pubescent below: mature fruit not seen.

In gravelly soil, near Kerrville, Texas. Spring.

A species most closely related to *Ptelea rhombifolia*, but easily distinguished by its glabrous or nearly glabrous leaflets whose blades are lustrous above, the filaments which are densely pubescent below and the apiculate anthers.

The original specimens were collected by Mr. A. A. Heller at Kerrville, Texas, and distributed in his Plants of Southern Texas, under no. 1690. Type in the herbarium of Columbia University.

Further Notes on the Agrimonies

By B. L. Robinson

In the December issue of Rhodora I discussed the identity of our New England agrimonies. The chief points of the argument were: (1) That *Agrimonia Brittoniana* must be reduced to *A. striata* Michx.; (2) That the plant which has been passing as *A. striata* must receive another name; (3) That the one-word descriptions of Muhlenberg's Catalogue are insufficient for definite interpretation and therefore furnish no proper basis for nomenclature in this group. As all the conclusions of my brief article have since been called in question I see that I was at fault in not stating more fully the substantial data upon which they were founded, as my reasons will, I think, carry conviction to most persons who examine them carefully.

The correct names for the two species passing in the Illustrated Flora as *A. Brittoniana* and *A. striata* depend, of course, upon an accurate determination of *A. striata* Michx. The exact identity of this species is, fortunately and notwithstanding a recent statement to the contrary, quite evident from the original description, for the characters mentioned therein apply to but one of our species. Happily, the agrimonies, while possessing considerable habital similarity, exhibit some good characters in the fruit. This in *A. Brittoniana* is turbinate, conspicuously sulcate-striate, crowned at the summit by connivent hooked bristles, and in maturity strongly reflexed against the rachis. In the small-fruited species, however, which has been passing as *A. striata*, the fruit is hemispherical, suberect, spreading, as moderately deflexed and marked by such shallow broad furrows as to appear ribbed by the narrow intervening elevations rather than sulcate-striate by the depressions. In the plant which I have called *A. gryposepala* Wallr. (the *A. hirsuta* of the Illustrated Flora) as well as in the tomentose species of more southern range, the bristles even at an early stage spread widely, concealing to some extent the middle portion of the fruit and preventing it from lying close back against the rachis in a manner to suggest the term reflexed. Let us now turn to the

original description of *A. striata* Michx. It is as follows: *A. spicis virgatis: fructibus reflexis, turbinatis, sulcato-striatis, apice tantum et quasi coronatim hispidis. Flores albidi. Hab. in Canada.*

To anyone who knows our agrimonies it will, I think, be quite clear which was meant. The turbinate form of the fruit at once cuts out the hemispherical-fruited species which has been passing as *A. striata*, as do also to some extent the words *sulcato-striatis*, since this trait must have been a pronounced feature in the Michauxian plant to have suggested the specific name. In *A. gryposepala* and the tomentose species the fruit is seldom if ever so strongly deflexed as to suggest the name *reflexis*, nor would it have been described as covered with bristles *only at the summit.** It is, therefore, clear that the description applies only to *A. Brittoniana* and that it fits this in all respects except as to *Flores albidi*, a very pardonable slip upon the part of Richard (no personalities intended), early corrected by Dr. Gray.

As I have stated in Rhodora the type of *A. striata* is in existence and well preserved. It is an exact match for Mr. Fernald's plant from St. Francis, Maine, which in its turn is the first mentioned type of *A. Brittoniana*. The Michauxian type is labeled *A. striata, Canada*, in the hand of Michaux, and it is against this specimen that Dr. Gray has written in his unmistakable hand *A. Eupatoria f. minor*. It is to be remembered, however, that this was done at a time when most of our American agrimonies were grouped together as *A. Eupatoria* and some decades before a keen-sighted investigator had pointed out after special study of much material both in the field and herbarium the characters which now clearly distinguish the plants in question. Such a determination, even by Dr. Gray, can scarcely have great weight when we consider that he was engaged in looking up hundreds of other matters and had never devoted special attention to the habitally similar species of *Agrimonia*. There is, however, another plant in the Michaux herbarium which, as it does not affect the identity of the type had, at least as to its locality, escaped my recollection until

* It is to be noticed that Michaux used the expression "*apice tantum et quasi coronatim hispidis*" in contradistinction to the "fructibus *divaricato-hispidis* of his *A. Eupatoria* which, although a mixture of *A. parviflora* Ait., and *A. incisa* Gray, shows clearly how Michaux would have described the very similar and also widely spreading bristles of *A. gryposepala*.

I recently looked up some herbarium notes made in Paris. It is a rather poor fragment representing the small-flowered species with thickened roots which has been passing as *A. striata.* It bears two labels. The first and apparently original one bears a curious mixture of Latin and French and reads *Agrimonia an species nova? Sitas fruits sont globulaires innominata*, while the other runs *Agrimonia striata Chicoutoumé Dodecand. 2-gynie, 11–2.* Not knowing at the time the location of the little Indian village Chicoutoumé (or as it is now written Chicoutimi) I did not recognize the geographical significance of this specimen and it soon passed out of mind in the pressure of other matters of interest, which naturally crowd upon an American botanist examining the herbarium of Michaux. Fortunately I preserved notes and a transcription of the labels. While this specimen may account for Dr. Gray's determination, which is, however, as I have stated, recorded against the other specimen, it cannot have formed any part of the type since Michaux himself had noted that the fruit was *globulaire*, nor are the fruits significantly striate or reflexed. The history of the specimen seems clear. Michaux having noted its globular fruit and probably its different foliage, regarded it at first as a new species. For some reason, however, probably from the fragmentary nature of the specimen, it was "lumped" with *A. striata* rather than characterized as a separate plant. But I feel sure that anyone who will read with attention the original description of *A. striata* will see that this second specimen with hemispherical or subglobular neither conspicuously striate nor markedly reflexed fruit can have had nothing to do with the characters given. Its locality, however, is highly interesting since, if there has been no confusion of labels, it extends the known range of the small-fruited species from southern Connecticut to the upper part of the Saguenay.

From the facts here stated there can surely be no doubt that *A. Brittoniana* should hereafter be called *A. striata* Michaux, a species intelligibly characterized by the original author and clearly shown by a well-preserved and unmistakable type, labeled in the hand of Michaux and bearing out in all details but the color of the petals the published description. This also appears to be the species which Ledebour characterized in 1823 as *A. pilosa.** At

least, careful examination has failed as yet to reveal a single constant difference. The species passes across the continent to the northwest (although extending far southward along the Rocky Mountains), then continues through northern Asia to central Europe. It is, in fact, one of many circumboreal species which, although on each continent subject to some trifling variations, pass from one continent to the other without noteworthy change.

Regarding the first specific names of *A. mollis* and of the small-fruited plant which has been passing as *A. striata* I was misled (as my critic appears also to have been in his earlier work) by an insufficient study of Wallroth's treatment. From further examination I see the doubt as to the application of *A. microcarpa* and *A. platycarpa* and, as my sole purpose in this whole matter has been to carry species back no further than could be accomplished with definiteness, I am very ready to adopt for the plants in question the names *A. rostellata* Wallr. and *A. pubescens* Wallr. concerning the application of which there can, I think, be no serious doubt.

As to the names *A. hirsuta*, *A. glabra*, and *A. pumila*, founded upon brief references in Muhlenberg's Catalogue, I must repeat my earlier view that they are *nomina subnuda*, and should give way to later names, the application of which can be established with greater certainty. While it is quite possible to advance ingenious and plausible hypotheses regarding Muhlenberg's agrimonies, they are after all only conjectures, and what is worse can never be anything more. For instance, all our species of agrimony, not even excepting the tomentose ones, are apt to be covered on the older stems by the thickened and indurated bases of the longer hairs, which thus render the stems decidedly scabrous to the touch. Under these circumstances the one-word description "rough-haired" will not possess for most persons working in the interests of "sound botany" that "exact sufficiency and beautiful adequacy" which has been ascribed to it.

The distinction between a described species and an undescribed one should not, it is true, be stated very dogmatically. The ele-

* It has been recently stated that this name is antedated by the specific combination *A. Dahurica*. This, I believe, is not the case although the varietal designation in the form *daurica* was employed a year or so earlier than Ledebour's name. The point, however, is not significant.

ment of judgment, that *bête noire* in matters nomenclatorial, cannot here be entirely excluded. But judgment will pretty generally require that a characterization of a species, to be valid, must state at least several features of the plant described, for such a combination diminishes in an almost geometric ratio, to the number of characteristics mentioned, the chance that a given description will apply to more than one plant. To permit the mere vernacular translation of a specific name to count as an adequate characterization is to remove all real distinction between *nomina nuda* on the one hand and described names on the other. "*Agrimonia pumila*" tells quite as much as "*Agrimonia pumila*,—little." To maintain that the former is unworthy of notice, and the latter is adequately described, is to make an arbitrary distinction based in no way upon the sufficiency of the information given.

The argument that *Agrimonia Eupatoria hirsuta* of Muhlenberg must have been the species later taken up as *A. hirsuta*, since otherwise Muhlenberg could not have known our commonest agrimony, seems to me to be a kind of reasoning very likely to lead to error. Experience has shown that the type of a species, when looked up, is often quite different from the plant suggested by a brief description, and the unexpected is constantly happening in such matters. The early tropical explorers, for instance, overlooked many plants which later investigation has shown extremely abundant in the regions they traversed, and on the other hand, they secured many plants of such rarity that it has taken years of patient search to rediscover them. To me it would seem quite possible that Muhlenberg was describing as "rough-haired" merely one of the most pubescent states of the plant which has been passing as *A. striata*, while his var. *glabra* may well, as suggested, have been the smoother although never really glabrous form of the same plant, for this species varies in pubescence and at times becomes distinctly scabrous without change of the fruit characters. When we see that such an acute observer and wide traveler as Michaux never recognized the plant which has been passing as *A. hirsuta*, I can see no convincing proof that Muhlenberg must have done so.

As the precedence of the earlier varietal name has been mentioned in connection with this genus, it is worth while here to ex-

amine more carefully the factors which enter into an ultimate settlement of that matter. Our nomenclature includes three very important classes of names, generic, specific, and varietal.* The first two have without objection or serious inconvenience been maintained as independent groups of names. A similar treatment of the second and third groups, which stand to each other in a somewhat similar relation, will I am confident, greatly simplify the whole problem of botanical nomenclature. There are several reasons for this. In the first place each category is already so large that the problem of determining the validity of a particular name in one would obviously be much simplified by excluding from competition the names in the other. In the second place varietal names have from the earliest times been used with greater laxity and diversity of method, not to say carelessness, than have specific names. This, however, is by no means all, the variety has been given, in general, only a very brief and *comparative* description, which is often intelligible only on the assumption that the plant in question is really a variety of the species to which it is attached. Varietal names as well as varietal descriptions are in many instances comparative and when separated from their original species may become not only ludicrously inapplicable to independent species but positively misleading when so applied. Precedence of the earlier varietal name may, perhaps, be a desirable principle in systematic zoölogy. But the chief difficulty in admitting the varietal name into full competition with the specific in botany is one which is likely from lack of parallel to be underrated by our zoölogical colleagues, namely the difficulty arising from the vast array of unclassified, unindexed, and ill-described horticultural varieties. To say that these are not botanical is quite idle. No one can possibly place a limit between botanical and horticultural varieties nor between botanical and horticultural descriptions. Already a tendency has in some quarters been manifested to change valid botanical names owing to the existence of purely horticultural homonyms. Why should we adopt rules which will so greatly increase the difficulty of the already intricate problem of nomenclature?

GRAY HERBARIUM.

* The categories of subspecies, variety, subvariety, and form are so closely connected that they may as to nomenclature practically pass as one since they have been used more or less interchangeably and have not been very successfully differentiated.

An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885-1886, XXXI.

By H. H. Rusby

(Continued from Bull. Torr. Club, **27**: 137. 24 Mr. 1900.)

Euphorbia pilulifera L. Pl. Sp. 454. Yungas, 4000 ft., 1885 (no. 1945). Also seen at Guanai, where the Indians are said to use it as an instillation to diseased eyes.

Euphorbia thymifolia L. Sp. Pl. 454. Falls of Madeira, Brazil, Oct. 1886 (no. 894).

Euphorbia cymbiformis Rusby, Mem. Torr. Club, **4**: 255. Yungas, 4000 ft., 1885 (no. 895).

Phyllanthus orbiculatus L. C. Rich. Act. Soc. Hist. Nat. Par. 113. 1792. Falls of Madeira, Brazil, Oct. 1886 (no. 903).

Hevea Spruceana Muell. Arg. Linnaea, **34**: 204? 1865–66. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 885) The principal rubber-yielding tree of the Beni district.

Jatropha Curcas L. Sp. Pl. 006. Reis, 1500 ft., June, 1886 (no. 889). The plant is used to form hedges and the seeds are used as a purge, under the name "Piñon."

Croton chamaedryfolius Griseb. Fl. Brit. W. Ind. 41. Mapiri, 5000 ft., Apr. 1886 (no. 901), and Falls of Madeira, Brazil, Oct. 1886 (no. 902). The same as Holton's no. 849.

Croton micans argyrophyllus Linnaea, **34**: 96. 1865–66. Unduavi, 8000 ft., Oct. 1885 (no. 2623).

Croton Rusbyi Britton, Mem. Torr. Club, **6**: 119. Mapiri, 2500 ft., May 1886 (no. 1224). No. 1223 is probably the same; my specimen is very poor.

Croton Spruceanus Benth. in Hook. Kew. Journ. **6**: 375. 1854. Falls of Madeira, Brazil, Oct. 1886 (no. 2622). A small tree of some 15 ft., growing on the bank of a stream.

Croton Urucurana Baill. Adansonia, **4**: 335. 1863–64. Mapiri, 2500 ft., May 1886 (no. 1197). Yungas, 4000 ft., 1885 (no. 1236b), and Unduavi, 8000 ft., Oct. 1885 (no. 900).

Manihot utilissima Pohl. Pl. Bras. Ic. **1**: 32. *pl. 24.* Cult. at Mapiri, 2500 ft., May 1886 (no. 887).

Manihot Aipi Pohl. *l. c.* 29. *pl. 23.* Cult. at Mapiri, 5000 ft. Apr. 1886 (no. 886).

Manihot Rusybi Britton sp. nov.

Inflorescence gray-tomentellate, the leaves puberulent on the veins underneath: stems slender, terete, pale: petioles 4–7 cm. long, stoutish, rigid: blades varying from entire, broadly ovate, 3-ribbed, to deeply 3-lobed or nearly 3-foliolate, the lobes ovate, acuminate and acute, .7–1 dm. long, 3–5 cm. broad, entire, thin, pale: racemes several, terminal, 3 or 4 cm. long, short-peduncled: pedicels 1 or 2 mm. long, stout: buds pyriform. Staminate flowers only seen: perianth 1 cm. long, open-campanulate, lobed about half way, the lobes ovate, obtuse, purple with yellowish summits; longer filaments about equalling the corolla, coiled, the shorter about half as long: anthers linear, nearly 3 mm. long: disk fleshy, yellowish, deeply 10-lobed or of 10 almost distinct incurved narrow rib-like glands: pistil not perceptible.

Falls of Madeira, Oct. 1896 (no. 888). "Perhaps the same as Mathews no. 1022 from Peru" [N. L. B.].

Acalypha hibiscifolia Britton, Mem. Torr. Club, **4**: 257. Yungas, 6000 ft., 1885 (no. 1275).

Acalypha communis Muell. Arg. Linnaea, **34**: 23. 1865–66, *fide* Britton, Unduavi, 8000 ft., Oct. 1885 (no. 1265) and Yungas, 6000 ft., 1885 (no. 1267).

Acalypha mollis H.B.K. Nov. Gen. et Sp. **2**: 94, *fide* Britton. Sorata, 8000 ft., Feb. 1886 (no. 1257). Another collection from the same locality, and unfortunately bearing the same number, is probably a large-leaved form of the same.

Acalypha scandens Benth. Hook. Kew Journ. **6**: 329. 1854. Falls of Madeira, Brazil, Oct. 1886 (no. 1258). The same as Spruce's no. 1000.

Acalypha sidaefolia Muell. Arg. Linnaea, **34**: 11. 1865–66. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (nos. 1263 and 1266) and Yungas, 6000 ft., 1885 (no. 1262 and perhaps no. 1276).

Acalypha capillaris Rusby, Mem. Torr. Club, **4**: 257. Mapiri, 5000 ft., Apr. 1886 (no. 1259).

Acalypha cuspidata Jacq. Hort. Schoenb. **2**: 53. *pl. 243.* Falls

of Madeira, Brazil, Oct. 1886 (no. 1274. 1273 from Yungas, 6000 ft. is regarded by Dr. Britton as of this species also).

Acalypha macrostachya Jacq. Hort. Schoenb. **2**: 63. *pl. 245.* Unduavi, 8000 ft., Oct. 1885 (no. 1268. 1269, from Mapiri, 2500 ft., May 1886, may be a form of this, but my specimen is fragmentary).

Acalypha villosa Jacq. Enum. Pl. Carib. 32, *fide* Britton. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 1271) and Falls of Madeira, Brazil, Oct. 1886 (no. 1272).

Acalypha callosa Benth. Pl. Hartw. 252, var., *fide* Britton. Unduavi, 8000 ft., Oct. 1885 (no. 1270).

Acalypha Brittoni sp. nov.

Branchlets, petioles, and principal veins of the lower leaf-surfaces gray-puberulent; branches slender, elongated, terete, striate, reddish: stipules 5 or 6 mm. long, linear-attenuate, reddish: petioles 5 or 6 cm. long, very slender: blades .75–1.25 dm. long, 4–6.5 cm. broad, ovate, lightly cordate at the base, abruptly contracted into an attenuate acumination at the apex, sharply serrate, very thin, the venation lightly prominent on both sides, the secondaries about 6 pairs, strongly ascending, connected by numerous straightish tertiaries: pistillate spikes only seen, the peduncles terminal, solitary, 2 or 3 cm. long, sharply angled, the spike 5–7 cm. long, 2.5 cm. broad, densely flowered, obtuse: bracts nearly 1.5 cm. long, two thirds as broad, 5-parted nearly to the base, the segments lanceolate, attenuate, the middle much the largest, the outermost a little shorter than the intermediate: ovary blackish, tuberculate, globose-oval, lightly lobed, the styles very stout, much broader upward, long-pinnatifid.

Mapiri, 5000 ft., May 1886 (no. 1260).

Acalypha inaequalis sp. nov.

Leaves gray and somewhat scurfy underneath: branchlets numerous, slender, flexuous, purple: stipules 3–5 mm. long, tapering regularly from the base to the acute point, thickish, rigid, keeled: petioles .5–1 cm. long, stout, strongly channeled above: blades 3–8 cm. long, 1–2.5 cm. broad, lanceolate, blunt at the base, acuminate and obtusish at the apex, finely serrate, thickish, pale green, the venation prominent underneath, the secondaries about 8 pairs, stout, strongly ascending or suberect, connected by the straightish tertiaries: spikes (staminate only

seen) sessile, 3–7 cm. long, 1.5 mm. thick, pendulous, densely flowered, gray: flowers 1 mm. broad.

Yungas, 6000 ft., 1885 (no. 1947).

Acalypha Benensis Britton sp. nov.

Densely gray-tomentose, the upper leaf-surfaces strigose: branchlets stoutish, flexuous, very leafy: stipules 2 mm. long, linear or almost setiform: petioles 1.5–2 cm. long, stout: blades .5–1 dm. long, 2.5–4 cm. broad, lance-ovate, rounded at the base, acuminate and very acute at the apex, finely serrate, entire toward the base, thickish; venation lightly prominent both sides, the 10 or 12 pairs of secondaries strongly ascending, connected by the straightish tertiaries: staminate spikes sessile, 4 or 5 cm. long, 3 mm. thick, gray, densely flowered: pistillate spike (but one seen) 1.25 dm. long, nearly 1 cm. broad, densely flowered: scales of the pistillate flowers strongly veined, densely pilose, 5–7 mm. broad, 4 mm. long, inclusive of the (about 10) slenderly subulate teeth, which are about 1.5 mm. long and separated by broad rounded sinuses: ovary strongly pilose, depressed-globose, deeply 3-lobed, about 2 mm. broad.

Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 1264). "Near *A. Tarapotensis* Muell. Arg." [N. L. B.].

Acalypha grandispicata Britton sp. nov.

Petioles, peduncles and youngest parts of the branchlets grayish-puberulent: stipules about 5 mm. long, 1 mm. broad, tapering regularly from the base to the acute apex, brown, membranaceous, lightly keeled: petioles 2–6 cm. long, stout but weak, coarsely angled: blades 2–3 dm. long, .6–1 dm. broad, oblong, acute at the base, abruptly acuminate and acute at the apex, finely short-serrate, very thin, glabrate, the secondaries 14–16 pairs, strongly ascending, connected by the tertiaries: only one (pistillate) spike seen, the peduncle 4 cm. long, stout, the spike more than 2 dm. long, 2.5 cm. broad, rather densely flowered: scales more than 1 cm. long, their breadth greater, strongly concave, deeply cleft into about 11 lanceolate acuminate segments, the middle longest, the outer regularly smaller: ovary depressed-globose, minutely tuberculate, lightly lobed, the styles short and broad.

Mapiri, 5000 ft., Apr. 1886 (no. 1261).

Acalypha Lechleri Britton sp. nov.

Youngest portions and inflorescence finely gray-tomentellate; stems stout, costate: stipules about 5 mm. long, the basal portion

broadly ovate, keeled, rather abruptly contracted into a linear attenuate termination, petioles .25–1 dm. long, rather weak, channeled above, striate underneath: blades 1.5–3 dm. long, 6–8 cm. broad, oblong or oval, blunt or rounded at the base, very abruptly short-pointed at the apex, finely or obtusely serrate-dentate, thin, bright green, the venation prominent underneath, the secondaries about 12 pairs, strongly incurved, mostly connecting at the margin and connected by the numerous crooked tertiaries: dioecious, the staminate spikes from the upper axils, .8–1.25 dm. long, 3 mm. thick, sessile, densely flowered, gray.

Unduavi, 8000 ft., Oct. 1885 (nos. 1420 and 2610).

Dr. Britton says "The same as Lechler's no. 2408, the pistillate spike terminal, 1 dm. long, 6 mm. broad." This agrees with Mr. Bang's specimens of the pistillate plant (no. 2610), in which the pistillate spike is gray and densely flowered; scales thick, 5 mm. broad when flattened, completely enclosing the ovary, about 1 mm. long, exclusive of the (about 14) linear acuminate acute teeth, the central 3 mm. long, gradually shorter toward the edges, the outermost 1 mm. long; sepals thick, broadly ovate, about 1 mm. long; ovary 1 mm. long, densely pilose; style and stigma blood-red, 2 mm. long, 1 mm. broad, thickish, strongly pinnatifid.

Acalypha erosa sp. nov.

Leaf-surfaces minutely papillose, inflorescence pubescent: branchlets elongated, slender, irregularly striate: stipules 3 or 4 cm. long, lance-ovate, acuminate and acute, brown: petioles 1–2 cm. long, stoutish: blades 1–2 dm. long, 5–7 cm. broad, oblong to obovate, narrow but slightly cordate at the base, abruptly short-pointed but obtuse at the apex, very coarsely and irregularly dentate, thin, the midrib and 14–16 pairs of lightly upcurved slender secondaries prominent on the lower side, the venation lightly reticulate: only young staminate spikes seen, the largest 7 cm. long, 3 mm. thick.

Guanai, 2000 ft., May 1886 (no. 1757).

Alchornea latifolia Sw. Prod. Veg. Ind. Occ. 98, *fide* Britton, Mapiri, 2500 ft., May 1886 (no. 2656).

Alchornea Pearcei Britton sp. nov.

Leaves minutely downy on the lower surfaces, pilose in the axils of the midrib: branches elongated, densely leafy: petioles 1–2 cm. long, very stout: blades 1–1.5 dm. long, 4–6 cm. broad,

oblanceolate or obovate, rounded at the narrow base, very short-pointed and very obtuse, distantly and coarsely serrate, very thick, 3-ribbed, the venation lightly prominent above, very prominent underneath, the stout secondaries about 4 pairs, the venation very finely reticulate: raceme (but one seen) 2 dm. long, very slender, pendulous, very loosely flowered: flowers purple, scarcely 1 mm. broad.

Mapiri, 5000 ft., Apr. 1886 (no. 1975). "Collected by Pearce at Maro, 3000–4000 ft., 1886. Male inflorescence branched, female simple. Styles 2, 1 mm. long, ovary and young fruit with minute stellate hairs" [N. L. B.].

Conceveiba Guianensis Aubl. Pl. Gui. **2**: 924. *pl. 353*. Mapiri, 2500 ft., May 1886 (no. 2656).

Conceveiba pubescens Britton sp. nov.

Staminate plant:—Branchlets, lower leaf-surfaces, etc., stellate-pubescent, the younger portions ferruginous: branchlets stout, purple, very leafy: petioles 2–4 cm. long, very stout, dilated at the insertion, striate, reticulate, deep-purple: blades 1.5–2 dm. long, .75–1 dm. broad, ovate, rounded to subcordate at the base, abruptly and obtusely short-pointed, coarsely sinuate-serrate, extremely thick and rigid, smooth above with the midrib and secondaries impressed, the venation strongly and sharply prominent underneath, the secondaries about 6 pairs, strongly ascending and connecting near the margin, the lowest pair much stronger, the straightish tertiaries connecting the secondaries: panicles solitary in the axils, short-peduncled, subulate-bracted at the base, the peduncle and rachis sharply angled, nearly 1 dm. long, the branches few and short, the flowers closely aggregated on the very short branchlets; buds globose, about 1 mm. broad.

Pistillate plant (if Mr. Bang's no. 2375 is the same): leave-much thinner, the pubescence nearly obsolete, the lowest seconds aries much longer: spikes almost simple, very slender, very loosely flowered: the flowers sessile and solitary (rarely geminate) at the nodes: calyx parted nearly to the base, the lobes oblong-ovate, obtuse, 1.5 mm. long: ovary 2.5 mm. long, densely white-pilose, ovoid: styles barely connate at the base, 4 or 5 mm. long, strongly flattened, oblong, blunt, purple at the tip, thick and fleshy.

Yungas, 4000 ft., 1885 (no. 2655, as to the staminate plant).

Same locality, Aug. 6, 1894 (Bang, no. 2375, as to the pistillate plant). Mr. Bang says, "A shrub 10 to 15 ft. high, with green flowers, in wet forest-mould."

Cleidion tricoccum Baill. Adansonia, **4**: 370. 1863–64. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 2652).

Tragia Fendleri Muell. Arg. Linnaea, **34**: 179. 1865–66. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 1863).

TRAGIA SELLOWIANA **glabrifolia** Britton var. nov.

Differs from the type chiefly in its subglabrous, larger leaves, Reis, 1500 ft., June 1886 (no. 1285).

Tragia volubilis L. Sp. 980. Guanai, 2000 ft., May 1886, (no. 2595). The same as Mandon's no. 1069.

Dalechampia Burchellii Muell. Arg. Mart. Fl. Bras. **11**^{2}: 649, *fide* Britton. Reis, 1500 ft., June 1886 (no. 2088. No. 2162 from Falls of Madeira appears to me identical).

Dalechampia scandens L. Syst. ed. XIII, 720. Guanai, 2000 ft., May 1886 (no. 1347).

Dalechampia triphylla Lam. Encyc. **2**: 258. Guanai, 2000 ft., May 1886 (no. 1215).

Mabea fistulifera Mart. Reise Bras. 479. Guanai, 2000 ft., May 1886 (no. 1178).

Mabea angustifolia longifolia Britton, Mem. Torr. Club, **4**: 258. Mapiri, 2500 ft., May 1886 (no. 1177).

Mabea paniculata Spruce ex Benth.; Hook. Kew Journ. **6**: 367. 1854. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 2711), and Falls of Madeira, Brazil, Oct. 1886 (no. 2609).

Omphalea diandra L. Syst. ed. X., 1264. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 1251).

Maprounea Guianensis Aubl. Pl. Gui. **2**: 893. *pl. 342.* Yungas, 4000 ft., 1885 (no. 1176).

Sapium biglandulosum Muell. Arg. Linnaea, **32**: 116. 1863. Falls of Madeira, Brazil, Oct. 1886 (nos. 1238 and 1239).

Sapium rhombifolium sp. nov.

Glabrous: branches elongated, erect or strongly ascending, slender, flexuous, the internodes about 1–2 cm. long: petioles .5–1 cm. long, purple: blades .5–1 dm. long, 2.5–4 cm. broad, rhomboidally ovate, acute at the base, abruptly short-acuminate and obtuse at the apex, thickish, pale green, shining above, the venation sharply prominent on both sides, the secondaries about 10 pairs, slender, diverging at an angle of about 45°, the veins

coarsely and irregularly reticulate: spikes simple, recurved, .5–1 dm. long, 2 or 3 mm. broad, the rachis thickish, rather loosely flowered: staminate flowers bright yellow, 1 mm. broad: pistillate flowers solitary near the base of the spike, very stoutly peduncled, the greenish perigone 3-lobed, the lobes thin, broadly ovate, erose, the stigmas very large and thick, fleshy, tapering, strongly circinately recurved.

Falls of Madeira, Oct. 1886 (no. 1824).

Pera distichophylla (Mart.) Baill. Etud. Gen. Euph. 434 (*Spixia distichophylla* Mart. Herb. Fl. Bras. 270). Falls of Madeira, Brazil, Oct. 1886 (no. 2597).

Pera sp. near *P. oppositifolia?* Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 2646).

Pera sp.? Guanai, 2000 ft., May 1886 (no. 1247). I have little doubt of the genus, though the specimen exhibits neither flower nor fruit.

No. 2633, from Falls of Madeira, Brazil, Oct. 1886, is a Euphorbiaceous plant in fruit, which Dr. Britton regards as an *Alchornea*. No. 713, from Junc. of Rivers Beni and Madre de Dios, is the same.

URTICACEAE

Celtis morifolia Planch. in Ann. Sci. Nat. III. **10**: 311. 1848. Yungas, 6000 ft., 1885 (no. 1755). The same as Bang's no. 1902 and (*fide* Britton) Matthew's no. 826.

Celtis Iguaneus (Jacq.) Sarg. Silva, **7**: 64, ex Rusby Ms. Yungas, 6000 ft., 1885 (no. 1286). The same as Bang's no. 1539.

Trema micrantha (L.) Blume Mus. Bot. Lugd. Bat. **2**: 58 (*Rhamnus micrantha* L. Syst. ed. X. 937). Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 1474). The same as Bang's no. 2065.

Trema affinis Blume l. c. Yungas, 6000 ft., 1885 (no. 1473).

Chlorophora tinctoria (L.) Gaud. Freyc. Voy. Bot. 108, in note (*Morus tinctoria* L. Sp. 986). Beni River, July 1886 (no. 1284).

Ficus Mathewsii Miq. Ann. Mus. Bot. Lugd. Bat. **3**: 298 (*Urostigma Mathewsii* Miq.; Hook. Lond. Journ. Bot. **6**: (1847) 549). Mapiri, 5000 ft., Apr. 1886 (no. 2496). The same as Mathew's 2059 and Traill's no. 715 from the Amazon.

Pharmacosycea Brittoni sp. nov.

Glabrous, or the petioles and midribs minutely puberulent: branchlets very stout, but weak, coarsely angled, somewhat verrucose: petioles 5 cm. or more long, slender for the size of the leaf, channelled above: blades 1–2.5 dm. long, .75–1 dm. broad, obovate, rounded at the base, very abruptly short-pointed and obtuse at the apex, entire, the venation inconspicuous above, prominent underneath, the secondaries about 18 or 20 pairs with intermediate lesser ones, at an angle of about 75° with the midrib, interarching near the midrib: fruit globose, 2 cm. long, the persistent thin margin reflexed, sinuately lobed: akenes on filiform upwardly thickened pedicels, oval or obovoid with a broad apex, 1.5 mm. long, 1 mm. broad.

Guanai, 2000 ft., May 1887 (no. 2640).

Sorocea muriculata Miq. in Mart. Fl. Bras. **4**[1]: 113. Junc. of Rivers Beni and Madre de Dios, Aug. 1886 (no. 2217), and Falls of Madeira, Brazil, Oct. 1886 (no. 2578). A widely branching shrub, 6–10 ft. in height.

Cecropia sp. The specimen is not fit for a diagnosis.

Urtica purpurascens Nutt. Trans. Am. Phil. Soc. **5**: 169. 1837. Unduavi, 8000 ft., Oct. 1885 (no. 2561).

Urtica Magellanica Juss. ex Poir. Encyc. Suppl. **4**: 223. Vic. La Paz, 10,000 ft., Apr. 1885 (no. 1254).

Urtica ballotifolia Wedd. Ann. Sci. Nat. III. **18**: 197. 1852. Unduavi, 8000 ft., Oct. 1885 (no. 1256).

Urtica flabellata H.B.K. Nov. Gen. et Sp. **2**: 40. Yungas, 4000 ft., 1885 (no. 1255).

Urera Caracasana (Jacq.) Griseb. Fl. Brit. W. Ind. 154 (*Urtica Caracasana* Jacq. Hort. Schoenb. **3**: 71. *pl. 386*). Yungas, 4000 ft., 1885 (no. 1464); Guanai, 2000 ft., May 1886 (no. 1468) and Beni River, July and Aug. 1886 (nos. 1465, 1466 and 1472).

Urera baccifera (L.) Gaud. Frecy. Voy. Bot. 497. Mapiri, 2500 ft., May 1886 (no. 1467). As large as a small apple tree, the trunk and branches thickly beset with brittle, stinging red and white prickles several inches in length and very slender.

Urera sinuata Wedd, Ann. Sci. Nat. III, **18**: 201. Yungas, 6000 ft., 1885 (no. 1470).

Urera rugosa sp. nov.

Hispidity confined chiefly to the inflorescence : branchlets stout, soft and weak, light brown : stipules about 7 mm. long, 4 mm. broad, the body broadly ovate, with an attenuate acumination : petioles 2.5–4 cm. long, very stout, weak ; blades 1–1.5 dm. long, 6–8 cm. broad, ovate or oval, rounded at the base, perfect apex not seen, coarsely short-dentate, the teeth obscurely apiculate : leaf very thin, dark green above, bright green underneath, subtrinerved, the venation inconspicuous above, prominent underneath, the midrib and six to eight pairs of strongly ascending secondaries dark purple, coarse, broad, nerved, connected by the straightish tertiaries : panicles 1 dm. or more long, densely branched, drooping, the rachis thick and fleshy, sparsely white-hispid : berries nearly globose, 4 mm. long, tipped with the short and very stout yellowish style.

Unduavi, 8000 ft., Oct. 1885 (no. 1471).

Urera filiformis sp. nov.

Leaf-surfaces and inflorescence minutely grayish-puberulent : branchlets stout, purple, terete : stipules 7–9 mm. long, purple, ovate, long-acuminate, keeled : only the younger leaves seen, the petioles 1 cm. long, broad, the blades 6–9 cm. long, 2.5–3 cm. broad, oblong-ovate, rounded at the base, acute, sharply serrate-dentate, thin, 3-nerved, the venation lightly prominent underneath, the secondaries about 10 pairs, the venation coarsely reticulate : panicles numerous, about 1 dm. long, consisting of few elongated, filiform branches along which the very small flower-clusters are rather densely disposed.

Yungas, 6000 ft., 1885 (no. 1469). This seems to be the same as E. P. Johnson's no. 97, from Tobasco, in Herb. Kew. under *U. microcarpa*.

Urera Rusbyi Britton sp. nov.

Glabrous, except the minute puberulence on the lower leaf-surfaces : branches coarse, deep purple, coarsely angled : stipules not seen : petioles 2–4 cm. long, very slender : blades 1.25–2 dm. long, 5–7.5 cm. broad, oval, narrowed but blunt at the base, abruptly short-acuminate and obtusish at the apex, shortly crenate-dentate, 3-nerved, the lateral nerves originating near the base, the very slender and inconspicuous venation coarsely reticulate : panicle shortly and stoutly peduncled, 2 or 3 dm. long and broad, the branches very numerous and very slender, the flower-clusters rather loosely disposed, the flowers nearly 3 mm. broad.

Yungas, 6000 ft., 1885 (no. 1774).

Pilea anomala Wedd. in Am. Sci. Nat. III, **18**: 217. 1852. Sorata, 8000 ft., Feb. 1886 (no. 1480) and Yungas, 6000 ft., 1885 (no. 1478). The same as Mandon's no. 1104.

Pilea rotundata Griseb. Fl. Brit. W. Ind. 158. Unduavi, 8000 ft., Oct. 1885 (no. 1483).

Pilea dauciodora Wedd. in Am. Sci. Nat. Ser. **18**: 223. 1852. Unduavi, 8000 ft., Oct. 1885 (nos. 1479 and 1485).

Pilea cymbifolia sp. nov.

Leaf-surfaces minutely stellate; stems erect, flexuous, stoutish, in my specimen nearly 4 dm. long, the internodes about 3 cm. long: stipules 6 or 7 mm. long, ovate, obtusish, brown, scarious: petioles 1.5–2 cm. long: blades .7–1 dm. long, 1.5–2 cm. broad, oblong and highly inaequilateral, blunt or rounded at the base, abruptly short-acuminate and obtuse at the apex, apparently disposed with the edges vertical, the upper edge nearly straight, the lower convex, finely serrate, the teeth varying from acute to rounded, thin, strongly 3-nerved, the lateral nerves starting from near the base, the venation little prominent on either side: peduncles 1.2–2 cm. long, very slender, erect, the globose heads nearly 1 cm. broad, densely flowered, fully expanded flower nearly 4 mm. broad, the divisions oval, obtuse, very thin, a little shorter than the filaments: anthers 1 mm. long and nearly as broad.

Yungas, 6000 ft., 1885 (no. 1482).

Pilea filipes sp. nov.

Very minutely puberulent: stems 2 to 4 dm. long, ascending, thickish but weak: stipules .5–1 cm. long, broadly ovate, exceedingly thin, transparent, reddish-brown: petioles 1.5–2.5 cm. long, slender: blades 2.5–6 cm. long, 1.5–3 cm. broad, ovate, rounded or blunt at the base, very short-pointed and acute or obtuse at the apex, crenate-dentate, very thin, pale below, 3-nerved: peduncles 4 or 5 cm. long, filiform, nearly erect, the cyme racemiform and secund, one or two cm. long, the flowers cymosely clustered at intervals of about 3–7 mm.: bracts 2 mm. long, broadly ovate, acute: pistil conical, a little shorter than the bract: the stigma capitate, small. Staminate flowers not seen.

Yungas, 6000 ft., 1885 (no. 1756). The same as Bang's no. 1788. Species near *P. ciliaris*.

Pilea sublobata sp. nov.

Younger portions and lower leaf-surfaces sparsely short-pilose:

stems 1–2 dm. long, rooting at the base, ascending, very slender, subsimple: stipules 2 or 3 mm. long, broadly ovate, blunt, scarious, brownish: pedicels 2–7 mm., slender: blades 1–2 cm. long, .5–1 cm. broad, ovate, blunt or rounded at the base, obtuse, deeply crenate-dentate or lobed, the teeth or lobes 3–5 pairs, thin, deep green: peduncles .5–1 cm. long, filiform: head about 3 mm. broad, densely few-flowered, the flowers purplish.

Unduavi, 8000 ft., Oct. 1885 (no. 1484).

Pilea urerifolia sp. nov.

Upper leaf-surfaces minutely stellate: stems blackish, stout but weak: stipules 5–7 mm. long, 2 or 3 mm. broad, tapering from the base, brown-scarious petioles 1.5–4 cm. long, weak: blades 1–1.2 dm. long, 4–6 cm. broad, oblong or oval, highly inaequilateral, obtuse at the base, abruptly contracted into a tapering acute summit, crenate-dentate, dark green, very thin, strongly 3-ribbed, the ribs blackish, the branches from the midrib meeting those from the laterals about one third of the distance from the latter: peduncles 1–3 cm. long, slender, weak, blackish: heads globose, yellow, about 1 cm. in diameter: pedicels 1.5 mm. long, transparent; calyx campanulate, nearly 2 mm. long and broad, deeply 4-lobed, the lobes oval, elliptical, transparent: filaments thick, as long as the perianth, fleshy: anthers oval, half as long as the filament. Pistillate flowers not seen.

Unduavi, 8000 ft., Oct. 1885 (no. 1481). Also collected by Mr. Bang at Sacramento, Yungas, Aug. 6, 1894 (no. 2374). Mr. Bang says, "A small plant, a few feet high, with white flowers, abundant in rich forest-mould."

Boehmeria brevirostris Wedd. Ann. Sci. Nat. IV, **1**: 201. 1854. Unduavi, 8000 ft., Oct. 1885 (nos. 1280 and 1281). The same as Mathews' no. 2039.

Boehmeria caudata Sw. Prod. Veg. Ind. Occ. 34. Yungas, 6000 ft., 1885 (no. 1277). The same as Mandon's no. 1107.

Boehmeria sp. near *B. Pavonii* Wedd. Ann. Sci. Nat. IV, **1**: 202. 1854. Yungas, 6000 ft., 1885 (no. 1278). The same as Bang's no. 328.

Boehmeria tenuistachys sp. nov.

Ferruginous-pilose, the lower leaf-surfaces somewhat tomentose, the upper strigose: branches mostly erect or strongly ascending, 1 dm. or more long, somewhat angled: stipules caducous, 6–8 mm. long, lanceolate, tapering regularly from the base to an acute

point: petioles 1.5–3 cm. long, slender: blades 3–6 cm. long 1.5–3 cm. broad, ovate, subrotund at the base, short-acuminate and acute, sharply serrate, thickish, strongly 3-nerved from the base, above finely bullate with the impressed venation, the venation prominent underneath: spikes simple, sessile or short-peduncled, 5–8 cm. long, 3 or 4 mm. thick, the rachis slender, pilose, the flower-clusters dense, rather closely disposed: fully expanded perigone 3 mm. broad, divided nearly to the base, transparent, brownish, the segments triangular-ovate, acutish.

Unduavi, 8000 ft., Oct. 1885 (no. 1475).

Pouzolzia asper Wedd.; DC. Prod. **16**[1]: 233 (*Margarocarpus asper* Wedd. Ann. Sci. Nat. IV. **1**: 204. 1854). Yungas, 6000 ft., 1885 (no. 2636). The same as Matthews' no. 2036.

Phenax ballotifolius (Kunth.) Wedd. Ann. Sci. Nat. IV. **1**: 192. 1854. Unduavi, 8000 ft., Oct. 1885 (nos. 1279 and 1282), and Beni River, July 1886 (no. 1283).

Phenax pauciserrata (Wedd.) (*P. Sonneratii pauciserrata* Wedd.; DC. Prod. **16**[1]: 235). Sorata, 8000 ft., Feb. 1886 (nos. 1476 and 1477).

Juglans sp.

Entire leaf (only the uppermost seen) about 3 dm. long, the petiole about 1 dm. long: leaflets 7 ½ pairs, sessile, 4.5–8 cm. long, 2–3 cm. broad, ovate, highly inaequilateral, rounded to subcordate, acuminate and acute, obscurely serrate, glabrate above, ferruginous-tomentose with branched or tufted hairs underneath; midrib and 12–14 pairs of crooked upcurved secondaries prominent on the under side, the latter connected by the tertiaries.

Sorata, 8000 ft., Feb. 1886 (no. 744). Dr. Britton regards this as an undescribed species, but the fruit specimen having been lost, a full description is impossible.

CASUARINEAE

Lacistema aggregata (Berg.). Yungas, 6000 ft., 1885 (no. 2704).

Index to recent Literature relating to American Botany

Andrews, A. L. Some Observations on Orchid Fragrance. Rhodora, **3**: 84–87. Ap. 1901.

Atkinson, G. F. On the Homologies and probable Origin of the Embryo-sac. Science, II. **13**: 530–538. 5 Ap. 1901.

Banker, H. J. A preliminary Contribution to a Knowledge of the Hydnaceae. Bull. Torr. Club, **28**: 199–222. 18 Ap. 1901.

Includes *Hydnum albo-magnum*, a new species from Alabama.

Barnhart, J. H. Heteromorphism in *Helianthemum*. Bull. Torr. Club, **27**: 589–592. 14 N. 1900.

Beadle, C. D. A shrubby Oak of the southern Alleghanies. Biltmore Bot. Stud. **1**: 47, 48. 8 Ap. 1901.

Quercus Boyntoni new.

Beadle, C. D. New Species of Thorns from the Southeastern States. Biltmore Bot. Stud. **1**: 25–47. 8 Ap. 1901.

C. Buckleyi, C. tecta, C. pallens, C. dispar, C. lassa, C. frugiferens, C. ignava, C. regnis, C. quaesita, C. consanguinea, C. condigna, C. lepida, C. invicta, C. munda, C. vulsa, C. opima, C. incilis, C. signata, C. teres, C. sinistra, and *C. tetrica*, new.

Beadle, C. D. & Boynton, F. E. Revision of the Species of *Marshallia*. Biltmore Bot. Stud. **1**: 3–10. *pl. 1–11*. 8 Ap. 1901.

M. grandiflora, M. Mohri and *M. ramosa*, new.

Best, G. N. Revision of the North American Species of *Heterocladium*. Bull. Torr. Club, **28**: 123–131. *pl. 13, 14*. 2 Mr. 1901.

H. Macounii and *H. heteropt-roides* new.

Bicknell, E. P. The Genus *Teucrium* in the Eastern United States. Bull. Torr. Club, **28**: 166–172. 27 Mr. 1901.

T. littorale, T. roseum, T. boreale, and *T. menthifolium* new species.

Bicknell, E. P. The Nomenclature of the New England Agrimonies. Bull. Torr. Club, **28**: 102–108. 2 Mr. 1901.

Boynton, C. L. & Beadle, C. D. Notes on certain Cone-Flowers. Biltmore Bot. Stud. **1**: 11–18. 8 Ap. 1901.

Rudbeckia Chapmani, R. Sullivanti, R. umbrosa, R. palustris and *R. Missouriensis*, new.

Britton, E. G. Bryological Notes.—I. Bull. Torr. Club, **27**: 648, 649. 29 D. 1900.

Britton E. G. & Taylor, A. Life History of *Schizaea pusilla*. Bull. Torr. Club, **28**: 1–19. *pl. 1–6*. 31 Ja. 1901.

Britton, N. L. The Application of Precedence of Place in Nomenclature. Science II, **13**: 588, 589. 12 Ap. 1901.

Burglehaus, F. H. Fertilization of the closed Gentian by Bumblebees. Plant World, **4**: 33. F. 1901.

Burnham, S. H. A February Outing in California. Plant World, **4**: 28, 29. F. 1901.

Chodat, R. Plantae Hasslerianae soit enumeration des Plantes récoltées au Paranay. Bull. Herb. Boiss. II. **1**: 395–442. 31 Mr. 1901.

New species in *Croton* (4), *Julocroton*, *Bernardia*, *Euphorbia*, *Wissadula* (3), *Pavonia*, *Melochia*, *Angelonia*, *Brunsfelsia*, *Buddlea*, *Spigelia* (2), *Vernonia* (5), *Eupatorium* (5), *Amaryllis*, *Gomphrena* (2), and *Polygala* (3).

Clark, H. L. Notes on the Flora of Woods Hole, Massachusetts. Rhodora, **3**: 87–89. Ap. 1901.

Clinton, G. P. Two new Smuts on *Eriocaulon septangulare*. Rhodora, **3**: 79–82. *f. 1, 2.* Ap. 1901.

Tolyposporium eriocauli and *Ustilago eriocauli*.

Cockerell, T. D. A. A new *Sophia*. Bull. Torr. Club, **28**: 48, 49. 31 Ja. 1901.

Sophia andrearum and var. *osmiarum*.

Collins, J. A. Two Wool-waste Plants at Lawrence, Massachusetts. Rhodora, **3**: 92. Ap. 1901.

Coville, F. V. The Home of *Botrychium pumicola*. Bull. Torr. Club, **28**: 109–111. *pl. 7.* 2 Mr. 1901.

Davenport, G. E. *Botrychium matricariaefolium* A. Br. Fern Bull. **9**: 37, 38. Ap. 1901.

De Candolle, C. Piperaceae et Meliaceae Brasilienses a cl. W. Schwacke lectae. Bull. Herb. Boiss. II. **1**: 353–366. 31 Mr. 1901.

New species in *Piper* (5), *Peperomia* (4), *Trichilia* (4) and *Cabralea* (2).

Eames, E. H. *Callitriche Austini* in Southwestern Connecticut. Rhodora, **3**: 89, 90. Ap. 1901.

Eastwood, A. Some small-flowered Species of *Nemophila* from the Pacific Coast. Bull. Torr. Club, **28**: 137–160. *pl. 15–20.* 27 Mr. 1901.

N. humifusa Kellogg, *N. quercifolia*, *N. Austinae*, *N. macrophylla*, *N. inconspicua*, *N. pustulata*, *N. micrantha*, *N. Kellogii*, *N. Plaskettii*, *N. humilis*, *N. nana*, *N. Congdoni*, *N. hispida*, *N. divaricata*, *N. tenera*, *N. gracilis*, *N. nemorensis*, *N. glauca*, *N. fallax*, *N. exigua*, *N. pulchella*, *N. alata*, and *N. rotata*, new species.

Eaton, A. A. The Genus *Equisetum* with Reference to the North American Species. Seventh Paper. Fern Bull. **9**: 33–37. Ap. 1901.

Ellis, J. B. & Everhart, B. M. New Species of Fungi from various Localities. Bull. Torr. Club, **27**: 571–578. 14 N. 1900.

New species in *Asterina*, *Dothidella*, *Urocystis*, *Puccinia*, *Phyllosticta* (2), *Phoma* (2), *Sphaeropsis*, *Hendersonia*, *Septoria* (2), *Melanconium*, *Melanconiopsis* gen. nov., *Cylindrosporium* (2), *Pestalozzia*, *Ramularia* (2), *Cercospora* (2), and *Cercosporella*.

Flett, J. B. Ferns and Allies at Unalaska and Nome City. Fern Bull. **9**: 31–33. Ap. 1901.

Gilbert, B. D. The ternate Botrychia in Central New York. Fern Bull. **9**: 25–28. Ap. 1901. [Illust.]

Gould, C. N. Range of the Mistletoe in Oklahoma. Plant World, **4**: 32. F. 1901.

Greene, E. L. A new Northern *Eupatorium*. Rhodora, **3**: 83, 84. Ap. 1901.

Eupatorium boreale.

Greene, E. L. Derivation of Columbine. Plant World, **4**: 31, 32. F. 1901.

Greene, E. L. Some literary Aspects of American Botany. Catholic Univ. Bull. 1901: 147–157. Ap. 1901.

Griffiths, D. Contributions to a better Knowledge of the Pyrenomycetes.—II. A new Species of Ergot. Bull. Torr. Club, **28**: 236–241. *f. 1, 2.* 18 Ap. 1901.

Claviceps cinereum new species.

Harbison, T. G. New or little-known Species of *Trillium*. Biltmore Bot. Stud. **1**: 19–24. 8 Ap. 1901.

T. stamineum, *T. Ludovicianum*, and *T. Vaseyi* new.

Hemsley, W. B. *Castilloa australis* Hemsl. (sp. nov.). Hook. Ic. Plant. IV. **7**: *pl. 2676.* F. 1901.

Native of Peru.

Hemsley, W. B. *Sapium Mexicanum* Hemsl. Hook. Ic. Plant. IV. **7**: *pl. 2680.* F. 1901.

Plate of *S. Mexicanum* accompanied by descriptions of two new species from Mexico, *S. Mexicanum* and *S. lateriflorum*.

Hemsley, W. B. *Sapium aereum* Klotzsch. Hook. Ic. Plant. IV. **7**: *pl. 2682.* F. 1901.

Native of Peru.

Hemsley, W. B. *Sapium ciliatum* Hemsl. (sp. nov.). Hook. Ic. Plant. IV. **7**: *pl. 2683.* F. 1901.

Native of Northern Brazil.

Hemsley, W. B. *Sapium subsessile* Hemsl. (sp. nov.). Hook. Ic. Plant. IV. **7**: *pl. 2684.* F. 1901.

Native of South America.

Hemsley, W. B. *Sapium Moritzianum* Klotzsch. Hook. Ic. Plant. IV. **7**: *pl. 2677.* F. 1901.

Native of South America.

Hemsley, W. B. *Sapium Poeppigii* Hemsl. (sp. nov.). Hook. Ic. Plant. IV. **7**: *pl. 2678*. F. 1901.
Native of Peru.

Hemsley, W. B. *Sapium cupuliferum* Hemsl. (sp. nov.). Hook. Ic. Plant. IV. **7**: *pl. 2679*. F. 1901.
Native of Argentina.

Hemsley, W. B. *Sapium suberosum* Muell. Arg. Hook. Ic. Plant. IV. **7**: *pl. 2681*. F. 1901.
Native of Barbados.

H[ooker], J. D. *Masdevallia deorsum*. Curt. Bot. Mag. III. **57**: *pl. 7766*. 1 Mr. 1001.
Native of New Grenada.

H[ooker], J. D. *Hymenocallis schizostephana*. Curt. Bot. Mag. III. **57**: *pl. 7762*. 1 Mr. 1901.
Native of Brazil.

Horton, F. B. The Discovery of a plumose Variety of the ebony Spleenwort. Plant World, **4**: 29, 30. F. 1901.

Howe, M. A. *Riccia Beyrichiana* and *R. dictyospora*. Bull. Torr. Club, **28**: 161–165. 27 Mr. 1901.
Riccia dictyospora new species.

Howe, M. A. The Allen Collection of Characeae. Jour. N. Y. Bot. Garden, **2**: 52–54. Ap. 1901.

Howell, T. A Flora of Northwest America. fasc. 4. Ligulifloraе to Hydrophyllaceae. 387–474. Portland, Oregon, 21 Mr. 1901.
New species in *Hieracium*, *Agoseris*, *Vaccinium*, *Arbutus*, *Arctostaphylos*, *Pleuricospora*, *Dodecatheon*, *Steironema*, *Erythraea*, *Gentiana* (3), *Navarretia* (2), *Polemonium*, and *Nemophila*.

Huber, J. Plantae Cearenses; Liste des plantes phanérogame récoltées dans l'etat Brésilien a Ceara en septembre et octobre 1897. Bull. Herb. Boiss. II. **1**: 290–329. 28 F. 1901.
New species and varieties in *Canna*, *Piper* (2), *Triplaris*, *Gomphrena*, *Mimosa* (2), *Caesalpinia*, *Centrosema*, *Clitoria*, *Zornia*, *Trichilia*, *Bunchosia*, *Polygala*, *Pavonia*, *Davilla*, *Ouratea*, *Vismia* (2), *Mentzelia*, *Begonia* (3), *Mouriria*, *Pterolepis*, *Eugenia Myrcia*, *Mimusops*, *Jacquemontia* (2), *Solanum*, (2), *Herpestis*, *Hygrophila*, *Diodia*, *Mapouria*, *Mitracarpus*, *Psychotria*, *Eclipta*, *Eupatorium*, and *Stilpnopappus*; the Piperaceae, Meliaceae and Begoniaceae by C. DeCandolle, the Polygalaceae by Chodat, and the Verbenaceae and Labiatae by Briquet.

Huntington, J. W. *Webera proligera* in Amesbury, Massachusetts. Rhodora, **3**: 91, 92. Ap. 1901.

Lloyd, F. E. & Tracy, S. M. The insular Flora of Mississippi and Louisiana. Bull. Torr. Club, **28**: 61–101. *pl. 8–11*. 2 Mr. 1901.

Long, W. H., Jr. The local Distribution and Occurrence of the Fungi of Austin, Texas, and Vicinity. Bull. Torr. Club, **27**: 579–588. 14 N. 1900.

MacDougal, D. T. Measurement of Growth. Jour. N. Y. Bot. Garden, **2**: 54, 55. *f. 3.* Ap. 1901.

Maxon, W. R. A List of Pteridophyta collected in Alaska in 1900 by Mr. J. B. Flett, with a Description of a new *Dryopteris*. Bull. Torr. Club, **27**: 637–641. 29 D. 1900.

Dryopteris aquilonaris, new species, allied to *D. fragrans*.

McKenney, R. E. B. Notes on Plant Distribution in Southern California, U. S. A. Bot. Centralb. Beiheft. **10**: *f. 1–7.* 1901. (Also separate 1–11.)

Meehan, T. *Asarum Canadense.* Meehan's Monthly, **11**: 49, 50. *pl. 4.* Ap. 1901.

Meehan, T. *Polypodium incanum.* Fern Bull. **9**: 28, 29. Ap. 1901.

Merrill, E. D. A Criticism on certain new Species of *Panicum*. Bull. Torr. Club, **27**: 593–597. 14 N. 1900.

Mez, C. Bromeliaceae et Lauraceae novae vel adhue non satis cognitae. Engler's Bot. Jahrb. (Beiblatt 67) **30**: 1–20. 12 Mr. 1901.

New species in *Bromelia* (4), *Canistrum* (2), *Portea*, *Dyckia* (2), *Lindmania*, *Hechia* (2), *Vriesea* (2), *Tillandsia* (6), *Cryptocarya*, *Ajouea* (3), *Persea* (2), *Phoebe* (2) and *Ocotea* (9).

Morris, E. L. North American Plantaginaceae.—II. Bull. Torr. Club, **28**: 112–122. *pl. 12.* 2 Mr. 1901.

P. verticillata, *P. picta*, *P. oblonga*, *P. ignota*, *P. speciosa* and *P. obversa* new.

Nelson, A. New Plants from Wyoming.—XIII. Bull. Torr. Club, **28**: 223–235. 18 Ap. 1901.

New species in *Ligusticum*, *Pseudocymopterus*, *Musineon*, *Lomatium*, *Dodecatheon*, *Swertia* (2), *Phacelia*, *Asclepias*, *Pentstemon*, *Castilleja*, *Valeriana*, *Chrysopsis*, *Machaeranthera* and *Rudbeckia*.

Palmer, W. Deforested Cuba. Plant World, **4**: 21, 22. *pl. 2.* F. 1901.

Parish, S. B. Southern Extension of the Range of *Polypodium Scouleri*. Fern Bull. **9**: 40–42. Ap. 1901.

Patouillard, N. Champignons de la Guadeloupe recueillis par la R. P. Duss. Bull. Soc. Myc. de France, **16**: 175–188. *pl. 7.* 28 F. 1901.

New species in *Marasmius*, *Androsaceus*, *Leptonia*, *Flammula*, *Laschia*, *Boletus*, *Melanopus*, *Phaeoradulum*, *Stereum* (2), *Corticium*, *Septobasedium*, *Cycloderma*, *Humaria*, *Helotium*, *Belonedium*, *Erinella*, *Leptosphaeria*, *Nectria*, *Stilbocera*, n. gen. *Stilbum*, *Isadia*.

Peck, C. H. New Species of Fungi. Bull. Torr. Club, **27**: 609–613. 29 D. 1900.

New species in *Amanita* (2), *Amanitopsis*, *Lepiota*, *Armillaria* (2), *Tricholoma*, *Omphalia*, *Boletus* (2), and *Boletinus*.

Peck, C. H. Report of the State Botanist on edible Fungi of New York, 1895–1899. Mem. N. Y. State Mus. **3**: 131–234. *pl. 44–68.* 1901.

Piper, C. V. New and noteworthy Northwestern Plants. Bull. Torr. Club, **28**: 39–45. 31 Ja. 1901.

New species in *Arabis*, *Trifolium*, *Astragalus*, *Solidago*, *Erigeron*, *Antennaria*, *Artemisia*, *Crepis*, *Dodecatheon*, *Gilia*, *Phacelia*, *Lappula*, and *Mimulus*.

Rennert, R. J. Teratology of *Arisaema*. Bull. Torr. Club, **28**: 247–250. 18 Ap. 1901. [Illust.]

Rolfe, R. A. *Habenaria repens* Nutt. Hook. Ic. Plant. IV. **7**: *pl. 2686.* F. 1901.

Native of America, from South Carolina to Brazil.

Rolfe, R. A. *Gymnopodium floribundum* Rolfe. Hook. Ic. Plant. IV. **7**: *pl. 2699.* F. 1901.

A new monotypic genus, from British Honduras.

Rothrock, J. T. The Willow Oak and swamp Hickory. Forest Leaves. **8**: 24. Ap. 1901. [Illust.]

Rydberg, P. A. Further Studies on the Potentilleae. Bull. Torr. Club, **28**: 173–183. 27 Mr. 1901.

P. horrida, P. New Species in *Potentilla* (10), *Horkelia*, and *Drymocallis*.

Rydberg, P. A. Studies on the Rocky Mountain Flora.—III. Bull. Torr. Club, **27**: 614–636. 29 D. 1900.

New species in *Stenotus* (2), *Macronema* (2), *Sideranthus* (3), *Pyrrocoma* (5) *Balsamorrhiza* (2), *Thelesperma* (2), *Hymenopappus* (4), and a new genus *Stenotopsis*.

Rydberg, P. A. Studies on the Rocky Mountain Flora.—IV. Bull. Torr. Club, **28**: 20–38. 31 Ja. 1901.

New species in *Arnica* (2), *Artemisia*, *Picradenia*, *Antennaria*, *Aster*, *Townsendia*, *Erigeron* (3), *Valeriana*, *Campanula*, *Castilleja* (3), *Mimulus*, *Pedicularis*, *Pentstemon* (2), *Polemonium* (2), *Gilia*, *Phacelia*, *Lappula*, *Cryptanthe*, *Mertensia* (4), *Impatiens*, *Geranium*, *Lupinus* (2), *Astragalus* (2), *Trifolium*, and *Lathyrus*.

Sargent, C. S. Notes on a Collection of *Crataegus* made in the Province of Quebec near Montreal. Rhodora, **3**: 71–79. Ap. 1901.

C. suborbiculata, *C. Canadensis*, *C. anomala*, *C. densiflora*, *C. Laurentiana* and *C. integriloba*, new.

Saunders, C. F. The climbing Fern in Spring. Fern. Bull. **9**: 30, 31. Ap. 1901. [Illust.]

Schumann, K. Chilenische Kakteen. Monats. für Kakteenkunde, **11**: 5–9. 15 Ja. 1901; 26–29. 15 Feb. 1901; 43–45. 15 Mr. 1901. [Illust.]

Schumann, K. *Pilocereus Schottii* Lem. Monats. für Kakteenkunde **11**: 9–11. 15 Ja. 1901. [Illust.]

Setchell, W. A. Notes on Algae. I. Zoe, **5**: 121–129. 1901.

New species in *Laminaria*, *Hedophyllum* gen. nov. (2), *Pleurophycus* gen. nov., *Iridaea*, *Fauchea*, *Constantinea*, and *Weeksia* gen. nov.

Shear, C. L. Notes on Fournier's Mexican Species and Varieties of *Bromus*. Bull. Torr. Club, **28**: 242–246. 18 Ap. 1901.

Thaxter, R. Preliminary Diagnoses of new Species of Laboulbeniaceae.—III. Proc. Amer. Acad. Arts and Sci. **36**: 397–414. Mr. 1901.

New species in *Stigmatomyces* (13), *Arthrorhynchus* (2), *Rhizomyces*, *Ceraiomyces* gen. nov., and *Dimeromyces* (3).

Toumey, J. W. An undescribed *Agave* from Arizona. Rep. Mo. Bot. Gard. **12**: 75, 76. *pl. 32, 33*. 6 Ap. 1901.

Tracy, S. M. & Earle, F. S. Some new Fungi. Bull. Torr. Club, **28**: 184–188. 27 Mr. 1901.

New species in *Meliola*, *Hystereostomella* (2), *Lembosia* (2), *Acanthostigma*, *Plowrightia*, *Cercospora* (2), and *Passalora*.

Trelease, W. A cristate *Pellaea*. Rep. Mo. Bot. Gard. **12**: 77. *pl. 34*. 6 Ap. 1901.

Underwood, L. M. A new *Adiantum* from New Mexico. Bull. Torr. Club, **28**: 46, 47. 31 Ja. 1901.

Adiantum modestum allied to *A. capillus-Veneris*.

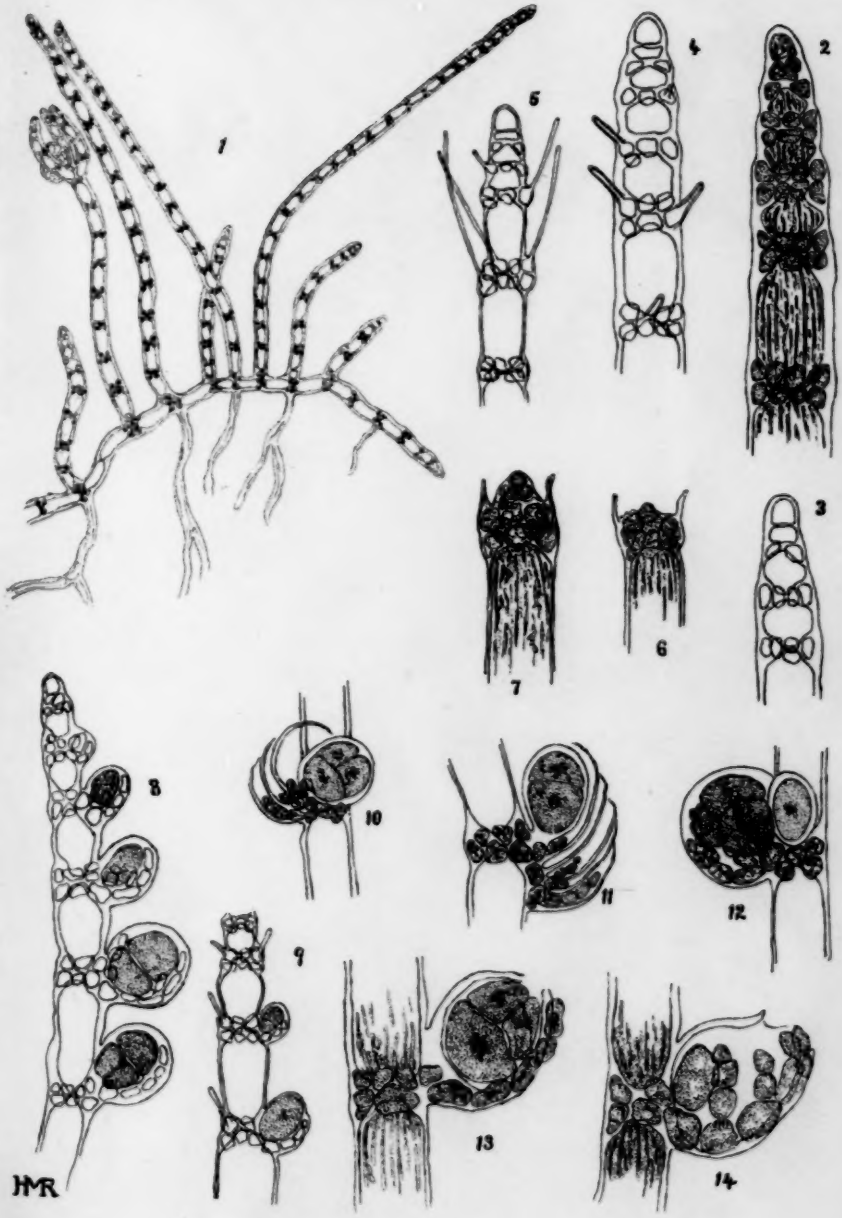
Urban, I. Plantae novae Americanae imprimis Glaziovianae III. Engler's Bot. Jahrb. (Beiblatt 67) **30**: 27–38. 12 Mr. 1901.

New species in *Vismia*, *Euplassa* (2), *Roupala*, *Weinmannia*, *Metrodorea*, *Aspidosperma*, *Oxypetalum*, *Barjonia*, *Trichilia* (5) *Cabralea*, *Celosia*, and *Gomphrena* (4).

Williams, E. M. The masked Tricholoma. (*Tricholoma personatum* Fr.) Plant World, **4**: 25–27. F. 1901. [Illust.]

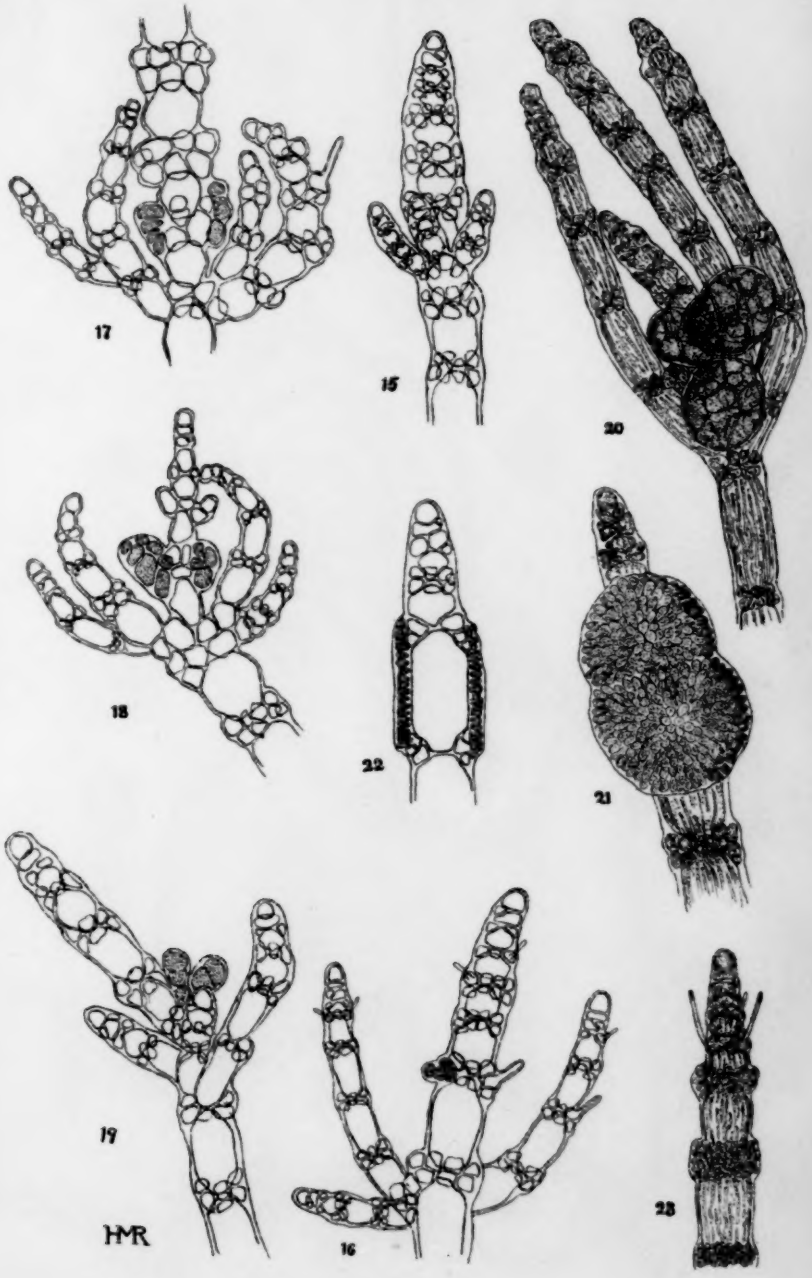
Zahlbrückner, A. Beiträge zur Flechten-Flora Süd-Californiens. Bull. Torr. Club, **27**: 642–647. 29 D. 1900.

New species in *Lecidea* (2), *Dirina*, *Platygrapha*, *Chiodecton* and *Arthothelium*.



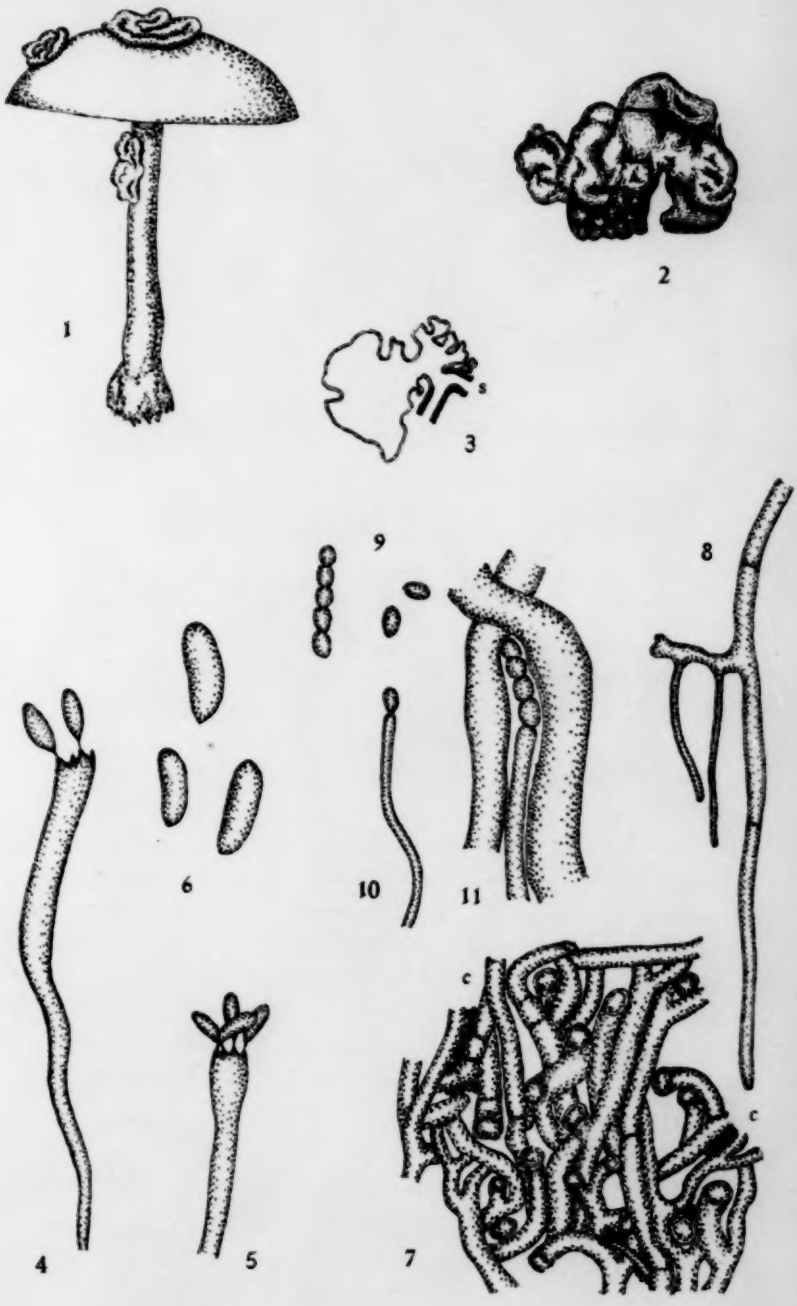
CERAMOTHAMNION CODII

THE HELIOTYPE PRINTING CO., BOSTON.



CERAMOTHAMNION CODII

THE HELIOTYPE PRINTING CO., BOSTON.



EXOBASIDIUM MYCETOPHILUM (Peck) Burt

THE HELIOTYPE PRINTING CO., BOSTON.